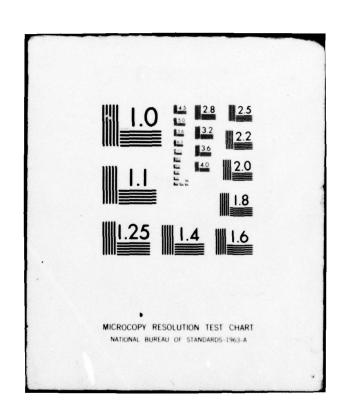
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This study revises and updates the appropriate sections of Military Handbook 217B, "Reliability Prediction of Electronic Equipment," pertaining to semi-conductor devices, section 2.2. More than 200 billion part-hours of field operating data were collected and analyzed during the study effort. Significant revisions were made to environmental factors and some quality factors.

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SUMMARY

This report describes the results of a 16-month program conducted by Martin Marietta to revise the discrete semiconductor device sections of MIL-HDBK-217B, "Reliability Prediction of Electronic Equipment." This report summarizes the data collected and the revisions to the handbook failure rate models; the actual revision sheets to be inserted into the handbook are provided as an addendum to this report.

More than 200 billion part-hours of operating data were collected in nine different environmental application catagories. The data were obtained as a result of an extensive collection program that included the survey of private contractors, government facilities, and research institutions throughout the country. The collected data were grouped, analyzed, and statistically tested for homogeneity before being combined into a normalized data base. In the process, approximately 50 percent of the collected data were deleted from the data base because it was either incomplete or nonhomogeneous. Table 1 on page 7 reflects the total operating part-hours by group and part type that were finally included in the data base.

Within the part type groupings as shown in Table 1, the data were organized into groups of similar environmental factor, π_E , and then into subgroups of similar quality factor, π_Q . A weighted average, basic failure rate was then calculated from the field data and modified by the existing π factors of MIL-HDBK-217B. A predicted failure rate was then selected from the applicable basic failure rate matrix charts of MIL-HDBK-217B at the average temperature and stress ratio of the data subgroups. All averages were weighted according to the number of operating part-hours of the data elements.

The factored field data failure rates were then compared to the predicted basic failure rates and a variance ratio calculated. This variance ratio was compared for many different combinations of data groups in search of definite patterns that would indicate the need to modify specific π factors or basic failure rates.

A general, across-the-board reduction in observed failure rate was the most significant result of the analysis. This appears to be predictable since semiconductor manufacturers are continuously advancing the technology for improved device quality. Introduction of TX and TXV requirements for semiconductor quality have tended to infuse higher quality into JAN and even commercial grade devices within the same manufacturing facility.

Martin Marietta recommends that MIL-HDBK-217B be modified to include:

Changes in environmental condition classifications to include separate factors for fighter, or supersonic, high performance, tactical aircraft versus transport or subsonic patrol and cargo aircraft. Also establishment of appropriate quantitative values for these factors. $\underline{2}$ Reduction of the quantitative value of the π factor for naval sheltered environment.

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3 Reduction in value of the quality level π factors for semiconductor groups I through V.

These changes are summarized in Tables 4 and 5.

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PREFACE

This final report was prepared by the Orlando Division of Martin Marietta Corporation for the Rome Air Development Center (RADC), Griffiss Air Force Base, New York, under Contract F30602-76-C-0337. The purpose of the contract was to revise and update MIL-HDBK-217B, section 2.2, that covers discrete semiconductors, excluding microwave devices ($f_0 > 400 \text{ MHz}$).

This report is CDRL Sequence Number A002 (CLI 0003) and covers the period from July 1976 to November 1977. The original termination date of the study was August 1977; but because of delays encountered in the acquisition of data required for the effort, the study completion date was extended to November 1977 at no additional cost to the government. The RADC Project Engineer was Mr. Lester J. Gubbins (RBRT).

In addition to Messrs. Butler, Cottrell, and Maynard, other contributors to the acquisition and analysis of data were: Brad Olsen, George Guth, Edwin Kimball, Thomas Kirejczyk, Neil Owen, Lynn Mercer, Aaron Penkacik, Betty Thomas, Lynn Westling, Robert Whalen, and Thomas Young. Overall guidance was provided by Messrs. William Carpenter, Robert Eldredge, and Thomas Gagnier.

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1.0 INTRODUCTION

Discrete semiconductors continue to be used in significant quantities in new electronic equipment, and their large population can have a definite impact on total equipment reliability. As reliability prediction plays an important role in the early conceptual definition of new equipment and in the planning for its operational support, it is necessary to continually assess the validity of reliability prediction models and methods. Therefore in July 1976, Rome Air Development Center awarded Martin Marietta Contract Number F30602-76-C-0337, entitled "Failure Rate Mathematical Models for Discrete Semiconductors".

This study consisted of an evaluation of the existing failure rate prediction models of MIL-HDBK-217B when compared to currently experienced field operating data. Where significant variances were detected, recommended changes to the existing models were defined in order to reconcile predictions with observed results.

This report describes method of evaluation, the results and conclusions of the engineering study, and includes as an addendum revised pages to update section 2.2 of MIL-HDBK-217B.

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2.0 DATA COLLECTION

To provide a data base for the study, a data collection effort was initiated upon contract award. This effort included a survey of industry and government agencies for recent field operating data on semiconductor devices and a literature search for published information in journals, reports, seminars, etc.

2.1 Data Survey

A list of potential data sources was generated from previous study contracts, Government-Industry Data Exchange Program (GIDEP) memberships, and from sources suggested by RADC. A total of 560 private companies and government agencies identified as potential data sources were sent a data survey letter. Responses were received from 260 - approximately 46 percent. Each survey sheet was reviewed to determine if the data were applicable to this study. After this initial screening, the remaining respondents were contacted by telephone to discuss the data in more detail and to determine the availability of the data. Where possible, the data were mailed directly to Martin Marietta. In those cases where significant data retrieval was possible, visits to the data sources were arranged. During these visits, the operational data were jointly reviewed, reduced as necessary, and brought back for further analysis. Component failure was defined as the inability of the component to properly perform its intended function, resulting in its being repaired or replaced. Whenever detailed failure information was available, all secondary failures, premature removals, procedural, and personnel errors were consored.

Since most data obtained listed only the quantity of failures and experience with no elaboration of failure modes and mechanisms, much of the data are dependent upon each source's ability to properly categorize its equipment failures. As a result of direct contact with most of the sources, however, it is felt that the majority of data contributed to this study were properly screened by the contributors. As an additional check, a statistical outlier test was performed on the data, and any data that deviated significantly from the majority were eliminated. Therefore a high degree of confidence has been developed, which warrants the practical application of these data.

Data collection visits were made to 47 data sources on 5 separate trips to the Northeast, Midwest, Southwest, southern California and northern California. Most of the useful data for this study were obtained from these data collection visits. A summary of data sources contributing to this study is contained in Appendix A. Table 1 summarizes total part-hours by group and part type after data screening as described in paragraph 3.1.

2.2 Literature Review

A comprehensive literature search was made to obtain information pertinent to the study on reliability of discrete semiconductor devices. A computer search produced a bibliography, which was then reviewed for applicability. Data sources used in this computer search included the Defense Documentation Center (DDC), NASA Scientific and Aerospace Reports (STAR), and the National Technical Information Services (NTIS). In addition, Martin Marietta's Technical Information Center (TIC) was researched for recent applicable technical data.

Table 1. Summary of Operating Data by Group and Part Type

Group	Part Type	Part Hours
Transistors	ng has samenasant.	
	S1, NPN	45,480,000,000
	Si, PNP	19,375,000,000
s sul law i	Ge, PNP	825,000,000
	Ge, NPN	1,635,000,000
II.	FET	1,310,000,000
III	Unijunction	22,000,000
Diodes	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ange aggi arts bo
IV	Si, gen purpose	25,386,000,000
John 103	Ge, gen purpose	1,232,000,000
Terms David	Zener/avalanche	2,235,000,000
VI	Thyristors	253,650,000
VII	Varactor, step recovery, and tunnel	385,000,000

3.0 DATA ANALYSIS

3.1 Statistical Methods, Assumptions, and Ground Rules

Operational data on discrete semiconductors were collected, analyzed, and summarized by component type, use environment, and quality grade. The following sections describe the basic ground rules and assumptions used in this analysis and define the statistical tests used in combining the data. The method used for calculating failure rates at a given confidence level is included. Numerical examples are given for the statistical tests and the calculation of failure rates.

Calculation of Failure Rates

All failure rates are calculated at the upper single-sided 60 percent confidence level. Prior to calculating the confidence levels, it had to be determined whether the component data were time or failure truncated. Since no known instances of failure truncated information were reported, received, or documented, it was assumed that the data were time truncated. The upper 60 percent confidence level failure rate can be calculated by using the component part hours and the Chi square (χ^2) value at 2r+2 degrees of freedom at the 40 percent level of significance point. If the data had been failure truncated, the value would be obtained at 2r degrees of freedom. The following general equation obtained from Reference 1 is used for calculating the failure rate:

$$\frac{\chi^2(\alpha, 2r + 2)}{2T}$$
 = upper single-sided confidence level

where

r = number of failures and determines the degree of freedom coordinate used in determining χ^2

2r+2 = total number of degrees of freedom

a = acceptable risk of error (40 percent in this study)

1-α = confidence level (60 percent in this study)

T = total number of component part hours.

As an example, two failures during 20.722 x 10^6 part-hours of airborne operation were used in calculating the failure rate at the upper single-sided 60 percent confidence level. Reference 2 was used as the source for the χ^2 value. The results are as follows:

Reference 1. ARINC Research Corporation, "Reliability Engineering," p 173, Prentice-Hall Inc., Engelwood Cliffs, New Jersey, 1964.

Reference 2. Hald, A., "Statistical Tables and Formulas," Table V, pp 41-43, John Wiley and Sons, Inc., New York, 1952.

Failure rate (60 percent confidence) =
$$\frac{\chi^2 (0.40, 6)}{2T} = \frac{6.21}{41.444 \times 10^6}$$

Failure rate (60 percent confidence) = 0.150 failures/106 part-hours.

Since the statistical tables used are limited to χ^2 values up to 100 degrees of freedom, it was necessary to calculate an estimate of the χ^2 percentile points wherever more than 49 failures were observed in the data. In accordance with Reference 2, χ^2 confidence level values are approximated by:

$$\chi_{\rm p}^2 \simeq 1/2 \ (z_{\rm p} + \sqrt{2f - 1})^2$$

where

 $\chi_{\rm p}^2$ = approximated χ^2 value

f = total number of degrees of freedom

Z_p = 0.25335 and is the value of the standard normal variable at the 60 percent significance level.

Using actual data from silicon, NPN, transistors, which had 1060 failures in $11,271 \times 10^6$ part-hours of fixed ground operation, the failure rate for the upper single-sided 60 percent confidence level is calculated as follows:

Failure rate (60 percent confidence) =
$$\frac{1/2(0.25335 + \sqrt{2(2122 - 1)})^2}{2(11.271 \times 10^6)}$$

Failure rate (60 percent confidence) = 0.095 failures/106 part-hours.

Test of Homogeneity of Data

As billions of part-hours of data are collected from many different sources, the analyst is faced with the task of determining how the data should be combined. Homogeneity of component/part-type populations must be maintained to prevent the introduction of bias and loss of precision in component failure rates. Therefore, all line items of failure rate data were carefully studied and evaluated, and then reordered and categorized on the basis of component type, component subgroup type, quality grade, and environmental application.

Before combining the data, a statistical test for homogeneity was required. The Dixon Criterion test was selected to statistically detect and identify those data entry failure rates that might significantly deviate from the family of failure rate entries under analysis. The ground rules and statistical assumptions used for Dixon Criterion testing are as follows:

1 Failure rate observations derived from each line entry come from a single normal population.

- Population mean and standard deviation of the failure rate observations are unknown. The data sample, consisting of the failure rate line entries, is the only source of information.
- 3 The probability of risk (a) for rejecting an observation that truly belongs in the group is 10 percent. Line items significantly different at either end of a 90 percent two-sided confidence interval are culled from the sample before a final combined failure rate estimate is calculated. (See Calculation of Failure Rates (above) for a discussion of the method used for calculating confidence intervals.)
- 4 A minimum of three line entries of failure rate data is necessary in testing the homogeneity of the samples.

As an example, Table 2 contains five ordered line items of failure data received on silicon transistors and the formulas for identifying outliers at the upper and lower ends for a sample size of five items. The formula for testing at the high end for a sample size of four is also included.

Table 2. Combination of Failure Data Line Entries for Silicon Transistors

Failure Rate (Failures/10 ⁶ Part-Hours)	Part-Hours (x 106)	Failures
X ₁ = 0.00024	8374.005	2
$x_2 = 0.00065$	1529.973	enter ten 1
$x_3 = 0.00350$	288.586	1
$X_4 = 0.00480$	4538.441	22
$x_5 = 0.25000$	31.860	8

For a sample size of five and if the low end is suspect,

reject
$$X_1$$
 if $\frac{X_2 - X_1}{X_5 - X_1} \ge 0.642$.

For a sample size of five and the high end is suspect,

reject
$$X_5$$
 if $\frac{X_5 - X_4}{X_5 - X_1} \ge 0.642$.

For a sample size of four and the high end is suspect,

reject
$$x_4$$
 if $\frac{x_4 - x_3}{x_4 - x_1} \ge 0.765$.

To test acceptability of sample X_1 at the low end, the applicable failure rates in failures per 10^6 part-hours are substituted into the corresponding formula and the result obtained is:

$$\frac{x_2 - x_1}{x_5 - x_1} = \frac{0.00065 - 0.00024}{0.25 - 0.00024} = 0.002.$$

This value is less than 0.642; therefore, for a sample size of five, the lowest ordered failure rate is within the acceptable boundary. To test acceptability of sample entry X_5 at the high end, again the applicable values are substituted into the corresponding formula for a sample size of five and the result obtained is:

$$\frac{x_5 - x_4}{x_5 - x_1} = \frac{0.250 - 0.0048}{0.250 - 0.00024} = 0.982.$$

This value is greater than 0.642. Therefore, the failure rate, 0.250, and its associated part-hours and failures must be rejected and would not be combined in the final failure rate estimate.

The test is rerun for a sample of four entries. Again, sample entry X_1 at the low end is found not be be rejected. At the high end, the result obtained is:

$$\frac{X_4 - X_3}{X_4 - X_1} = \frac{0.0048 - 0.0035}{0.0048 - 0.00024} = 0.285,$$

which is less than 0.765. This time all data are accepted. Thus, an iterative testing process using the Dixon Criterion is continued until both the low end and high end values are accepted.

The data and tables used for determining formulas and statistics to be applied for various sample sizes were obtained from Reference 3.

3.2 General Analysis Procedure

A general method for analyzing the collected data was utilized to compare base failure rates and the effects of different environments and quality grades. The method developed normalizes the effects of actual temperature and stress realized by the parts on which data were collected and compares the results to the existing base failure rates and modifying factors in MIL-HDBK-217B. Where significant differences occurred, revised model parameter values were derived. However, throughout the analysis, engineering logic was used in conjunction with analytical results in developing the model parameters.

Reference 3. Natrella, Mary G., "Experimental Statistics," pp 17-1 through 17-3, National Bureau of Standards Handbook 91, August 1963.

Additional analyses were performed to fill in gaps in the collected data with the primary purpose being to ensure consistency between a given model's quantitative factors that were changed as a result of the collected data and the remaining factors that could not be verified or changed because of lack of data.

Preparing Raw Data for Analysis

The general analysis method is illustrated by the procedure used to analyze the data collected on all discrete semiconductors. First, as shown in Figure 1, the data were summarized by environment and quality grade. The observed failure rate then calculated at the 60 percent one-sided upper confidence level. It was not practical to summarize the data to more detailed levels, such as temperature and stress, because the data then became so sparse in most categories that realistic failure rates could not be calculated. In most cases, temperature was found to remain in a reasonably narrow range (10 to 15°C) within a given use environment. For example, most fixed ground data were generated at an ambient temperature range of 30 to 40°C.

Second, the data were analyzed to determine predicted failure rates using MIL-HDBK-217B for each category upon which observed data exist. Temperature and stress information obtained from the data sources was used in determining these failure rates. If there were several temperatures/stresses involved for a given category, an average was used. However, this average was weighted heavily toward the source or sources representing the largest quantity of data. In a few cases the temperatures/stresses were not available from the data source and had to be estimated.

Base Failure Rate Analysis

Data were now ready to be analyzed for deviations from the existing MIL-HDBK-217B failure rate models. The procedure shown in Table 3 was used to determine differences in the observed versus predicted failure rates for specific environments and quality grades. Data in this table indicate that the basic failure rate in MIL-HDBK-217B for field effect transistors is too high since all environments have a low observed-to-predicted ratio. The weighted average was used to reduce the base failure rate, $\lambda_{\rm b}$, in MIL-HDBK-217B for these devices. If the handbook base failure rate is reduced, the average of the predicted values is equal to the observed value.

Referring to Table 3, columns 1 and 2 are the cumulative number of failures and operating part-hours respectively from all data sources that have a common environmental application and quality factor. Columns 3 shrough 8 are the respective π which presently exist in MIL-HDBK-217B. Column 9 is a log number that provides traceability to the data base listing, which is included in Appendix D.

Column 10, the observed failure rate, is calculated from the data in columns 1 and 2, using the procedure described in the paragraph titled "Calculation of Failure Rates." Column 11 is the result of dividing Column 10 by the product of Columns 3 through 8 and produces a basic observed failure rate ($\lambda_{\rm bob}$) that can be compared directly to the predicted failure rate. Column 12, the predicted failure rate, is selected from the existing tables of

MIL-HDBK-217B using the average stress ratio and operating temperature supplied by the data source. Finally, Column 13 is the ratio of observed failure rate to predicted failure rate, which measures the degree to which the study data base suggests a correction in MIL-HDBK-217B factors.

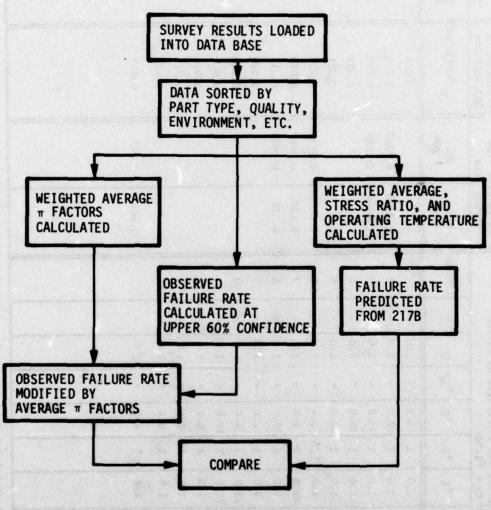


Figure 1. Sequence for Data Analysis

Table 3. Field Effect Transistors - Data Summary

S	Survey Data - Sorted and Su Type and by # Factor	Sorted and Summarized by Device of by # Factor	and S Facto	ummarı	zed b	y Dev	ice		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
Failures	Operating 6 Hours X 10 ⁶	TE	A.	″Q	" 52	[≖] c	4	L0G No.	60% A ob	60% λ bob	λ _b Predicted	Observed Predicted
*0	2.264	1.0	τ	0.2	11	1.0	-	1			0.044	
443	364.0	5.0	٦	10.0	1	1.0	1	2	1.2338	0.0247	0.036	69.0
372	231.0	5.0	-	20.0	•	1.0		3	1.6349	0.0164	0.036	0.45
*	0.021	25.0	-	10.0	•	1.0	1	4	AT AT		0.052	
*1	1.019	25.0	7	20.0	•	1.0	1	2			0.021	
3	630.2	1.0	1.5	0.4	•	1.0	•	9	0.00663	0.011	0.015	0.73
5	45.978	25.0	-	2.0	1	1.0	1	7	0.137	0.0027	0.019	0.14
8	28.99	5.0	-	10.0	•	1.0		8	0.326	0.0065	0.017	0.38
*	2.64	5.0	1	2.0	ı	1.0	•	6			0.020	
*	0.042	25.0	1	2.0	ı	1.0	•	10			0.019	
8	0.021	25.0	1	10.0		1.0	•	п			0.019	
8	0.307	1.0	-	0.2	1	1.0	1	12			0.012	
*0	0.050	1.0	1	7.0	•	1.2	1	13			0.012	
*	0.025	1.0	-	7.0	1	1.0		14			0.012	
*	6.39	8.9	-	4.2	1	1.0			0.486	0.017	0.027	0.63
•	TOTALS		The state of						344			
833	1306.6											0.64
					128							
									20	nervij		
										tioning.		

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **.

Factor Analysis

The correlation of failure rates of parts of various quality level and of differing environmental and other application circumstances was made by graphic comparison of the summarized and normalized data base. A one-dimensional graph such as the example shown in Figure 2 was used.

The data points are plotted according to the ratio of observed to predicted basic failure rate; the scale is shown on the left. The data points are arbitrarily spread horizontally across the page in order to allow room for a flag at each point to identify the associated environment and quality factor. Also, to provide a weighting factor, the number of part operating hours represented is shown. With relative ease one can compare and observe that the various factors are scattered throughout the distribution.

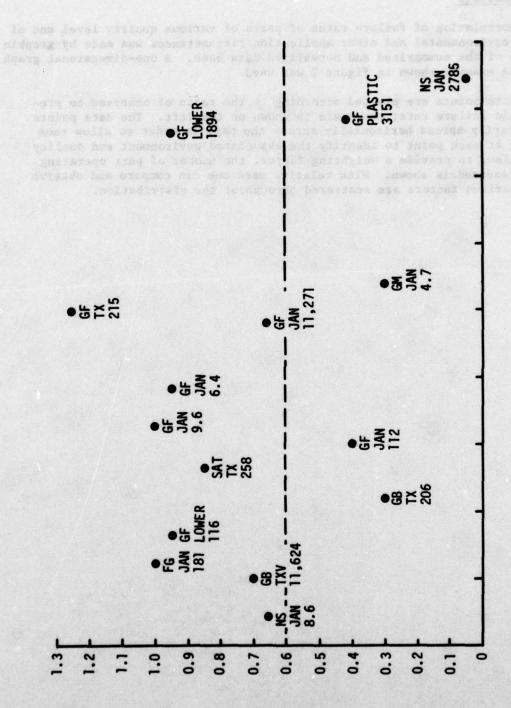


Figure 2. T Factor Analysis

4.0 ANALYSIS RESULTS

This section presents the results of analyzing the data collected during the program. These results are expressed in terms of recommended revisions to the existing data on MIL-HDBK-217B. The complete quantitative models and factors have been prepared for insertion in MIL-HDBK-217B. The primary revisions involve the environmental and quality factors. The airborne environment was expanded to four categories to separate the effects of supersonic aircraft such as fighters from other types of aircraft such as transports and heavy bombers. The recommended changes can be divided into two general categories: those that are clearly suggested by the data base of this study, and those that are suggested in literature and found to be compatible with the data base.

4.1 Environmental Factors

The vast majority of data were found in two principal environmental categories, ground fixed and naval sheltered. In the process of data analysis, much of the naval sheltered data were censored because of variances that did not fit in the distribution of the general data base. Since all of the non-conforming data were collected from a single source and no further examination was possible into the reporting methods of that contractor, it is assumed that some "sanitization" of the data had occurred and that it should be disregarded.

There existed an area of question as to interpretation of this data, however. Much of the naval sheltered data were collected from submarine applications, which may present a more benign environmental stress than defined for naval sheltered conditions. If, in fact, submarine environment approaches that of ground benign, and this data were reevaluated on that basis, much more of the data would have been accepted by the homogenity test. The effort allotted for this study did not permit a conclusive persuit of this matter.

Regardless, the naval sheltered data, which was retained in the data base, was supportive of the recommendation in Reference 4 that electronic failure rates are lower for shipboard environment than for aircraft environment.

The aircraft environment was expanded to four categories to separate supersonic aircraft from other types. It is generally accepted that equipment on supersonic aircraft is exposed to higher levels of shock, vibration, and acoustic noise, and to a more severe operating temperature range than equipment on other aircraft. Also the mission duration is usually much shorter for supersonic aircraft, thereby creating more cyclic problems. Therefore, significant differences in reliability are expected and have been observed. The quantitative relationships of the new factors were taken from the study reports

Reference 4. Pearce, M.B. and Rise, G.D., "Technique for Developing Equipment Failure Rate K Factors," Boeing Aerospace Company, December 1973.

of References 4 and 5 and are summarized in Table 4. The subscripts F and T, as added to symbols $A_{\rm I}$ and $A_{\rm U}$, designate application in fighter type aircraft and transport type aircraft respectively.

4.2 Quality Factors

After all data had been normalized and compared to a basic failure rate as predicted by existing MIL-HDBK-217B, the general pattern that emerged indicated an across-the-board variance in favor of the observed failure rates. This was attributed to the continuing maturation of the semiconductor manufacturing industry. With the advent of JANTX and JANTXV quality specifications and the growing market demand for these devices, more semiconductor production lines are being controlled to higher quality standards. Corrective action feedback from tests of the higher quality product tends to infuse quality improvement to all products in a given plant.

Revisions to MIL-HDBK-217B could be implemented either by reducing the base failure rate factor, A, or by reducing the quality π factors. The latter method was chosen and included in the changed section 2.2, which is included as attachment to this report.

4.3 Discrete Semiconductor Groupings

During the study a suggestion was received that semiconductors should be grouped according to MIL-STD-701. This suggestion has basis for consideration in that the semiconductor type groupings in MIL-STD-701 are generically related and therefore very likely have similar failure mechanisms, life characteristics, and temperature coefficients. A failure rate derived exclusively from field experience of devices of that family and a prediction model based upon that data would undoubtedly be more consistent.

However, the validity of this theory could not be established or rejected from the data. While over 200 billion hours of part operating data were collected, only a very few groupings from MIL-STD-701 included enough operation time to establish a statistically valid failure rate.

For example, the first group in MIL-STD-701, Table I, lists only two JEDEC registration numbers, 1N647 and 1N649. A JANTX quality device operated in ground benign environment at standard temperature (25°C) and 30 percent applied stress is predicted to have a mean time between failure of approximately 500 million hours. A test to evaluate the degree to which this reliability is achieved, would require accumulated part-hours equal to several times the expected MTBF, a number in excess of 1 billion hours. Likewise, this number of part operating hours would be required for each combination of environment, quality level, electrical stress, and temperature. Even with the present seven groups (excluding microwave transistors and diodes) we must make extensive use of extrapolation of data and engineering judgements to validate the existing models.

Reference 5. Kern, G.A., and Drnas, I.M., "Operational Influences on Reliability," p 5-4, Hughes Aircraft Company, RADC-TR-76-366, December 1976.

It is thus concluded, at least from the data base of this study, that any additional subdivision of groupings in MIL-HDBK-217 is not practical unless prediction models are established on some basis other than operating failure data.

Recommended changes are summarized in Tables 4 and 5.

Table 4. Environmental Factors

01	d	Net	4
G _B	1	G _B	1
SF	1	SF	1
G _F	5	G _F	5
A _I	25	NS	10
NS	25	AIT	12
GM	25	AUT	20
N _U	25	G _M	25
A _U	40	NU	25
M _L	40	AIF	25
		AUF	40
		M _L	40

Table 5. Quality Factors

	Grou	ıp I	Gro	up II	Gro	up III	Grou	up IV	Gro	up V
Quality	01d	New	01d	New	01d	New	01d	New	01d	New
JANTXV	0.2	0.12	0.2	0.12	0.8	0.5	0.5	0.15	0.5	0.3
JANTX	0.4	0.24	0.4	0.24	1.6	1.0	1.0	0.3	1.0	0.6
JAN	2.0	1.2	2.0	1.2	8.0	5.0	5.0	1.5	5.0	3.0
Lower	10.0	6.0	10.0	6.0	40.0	25.0	25.0	7.5	25.0	15.0
Plastic	20.0	12.0	20.0	12.0	80.0	50.0	50.0	15.0	50.0	30.0

No changes were made in Groups VI and up.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

A very substantial effort was made during this study program to gather all available data on semiconductor failure experience in field applications. Further, careful scrutiny was given the collected data to verify the accuracy and completeness of all variables that currently exist in MIL-HDBK-217B. It is believed that this study has been successful in bringing together some valid conclusions and in so doing has improved MIL-HDBK-217B.

Some consternation was felt by those involved with this project for the inordinate difficulty encountered in gathering a limited amount of information, at least when measured against the vast number of known semiconductor applications in military equipments. Part of this problem appears to be caused by the competitive nature of the aerospace industry and the real or imagined advantage that might be "given away" by divulging such information.

As a general conclusion from both the data analysis and from literature and survey comments, the mathematical models of section 2.2 in MIL-HDBK-217B are valid with only minor modifications required. These modifications include the changes to the environmental and quality π factors.

5.2 Recommendations

Detailed studies should be performed to determine the difference between submarine and shipboard sheltered environments. Data from these two environments were combined during this study because there was no statistical justification for separating them. This was a result of insufficient comparative data with which to perform a statistical test. Shipboard data are more difficult to obtain, because documentation of failures to the part level is not done as rigorously as for submarine systems.

Military data collection systems should be reevaluated so that more reliability oriented information can be collected. These systems presently are useful for logistics and replacement data studies, but are difficult and sometimes impossible to use as a source for reliability data. In defense of these data collection systems, note that one problem in collecting part-level data is the growing tendency to throw away failed modules rather than isolate and repair failed parts within them.

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- 15. "Semiconductor Vulnerability," AD 912136L
- 16. "Study of High Burnout Microwave Diodes," AD 883251
- 17. "Investigation of Effects of Nonrecurrent Forward Surge Currents on the Electrical Parameters of the 2N1913SCR," AD 873142
- 18. "Investigation of Current Mode Second Breakdown," AD 787519
- 19. "Technique for Developing Equipment Failure Rate K Factors," AD 916002L

APPENDIX A

DATA SOURCES

DATA SOURCES

Aerojet Corporation Azusa, California

Autonetics Anaheim, California

Electronic Communications, Inc. St. Petersburg, Florida

Ford Aerospace & Communications Palo Alto, California

General Dynamics Pomona, California

General Electric Corporation Syracuse, New York

GIDEP Corona, California

Harris Corporation Melbourne, Florida

Hewlett Packard Palo Alto, California Litton Industries Van Nuys, California

Magnavox Corporation Fort Wayne, Indiana

Martin Marietta Corporation Orlando, Florida

Raytheon Corporation Wayland, Massachusetts

RCA Consumer Products Indianapolis, Indiana

Reliability Analysis Center Rome, New York

Sperry Univac St. Paul, Minnesota

Sperry Systems Management Great Neck, New York

APPENDIX B

INTERMEDIATE DATA SUMMARY - TRANSISTORS

-		-								
8	FET		69 JA	JAHTAV 857	8228	2.264	•	37	۲.	FET
	1.	TOTAL	2.26	2.264 MILLION HOURS	H HOI	OURS		FAILURES	RATE 15	0 FAIL/18***GHRS
226	FET		GF L0	LOVER	953	227	202	55	.5	N CHAN
92	FET			LOWER	653		2	2	5.	N CHAN
225	FET		5	LOWER	653	•	•	8	s.	P CHAN
62	FET		3	LOUER	953	109	195	58	s.	N CHAN
23	FET		פניונ	LOLER	853	9	~	55	.5	P CHAN
	2.	TOTAL	36.	364 MILLION HOURS	TON H	OURS	443	443 FAILURES	RATE 15	1.21703 FAIL/10**6HRS
224	F F		4 d	PLASTIC 053	853 853	168 63	328	55 55	ě.	N CHAN P CHAN
1	÷	TOTAL	231	231 MILLION HOURS	H NO.		372	FAILURES	RATE 15	1.61839 FAIL / I Brow GHRS
2	FET		GM LOUER	LER.	854	.621	-	30	8.	FET
1	÷	TOTAL	.821	.821 MILLION HOURS	H NOI	DURS	-	FAILURES	PATE 1S	47.619 FAIL/10xx6HRS
=	FET		IS LOUER	IS LOUER 032AG 1.01	032AG 1.019	1.019	-	46	.3	
1	*	TOTAL	1.019	1.819 MILLION HOURS	ION H	DURS	-	FAILURES	RATE 15	. 981354 FAIL / 10 ** SHRS
382			XTHAL TAR SAT JANTX XTHAL TAR	XTHAL TAX XTHAL TAX XTHAL TAX	050C .54 050D .40 052 629	.543 .482 629.3	6 6 M	K K K	29. 29. 2.	
	٠	TOTAL	638.245 MILLION HOURS	38.245 MILLION HOURS	ION H	DURS	3	FAILURES	RATE 15	.476005E-2 FAIL/10***SHRS
222	FET FET		SUB JAN SUB JAN			41.978	-4	54 VIV < 54	8.8.	
	7.	TOTAL	45.978	HILL	MILL ION HOURS	OURS	5	FAILURES	RATE 1S	. 108748 FAIL/18***
5.4	FET.N FET.N		95 10 10 10 10 10 10 10 10 10 10 10 10 10	LOUER	963 963	16.81 12.18	9 7	36 30	1.	
		TOTAL	28.99	28.99 MILLION HOURS	ION H	DURS	8	FAILURES	RATE 15	RATE IS . 275957 FAIL / 10**6HRS
\$ 5 E 2 8	EEEEE		#### 55555		8554 .96 8554 .96 8554 .43 8554 .217	8: 96: 22: 7:24 19:		***	ահաման անան	рия. Вия.
-	9.	TOTAL	2.64	i i	**************************************	*****	****	CONT. 1.00.0	*******	**************************************

						1	4	
202	JFET. NCHAN	GH JAN	. 990	.0416	0	36	GH JAN 866 .0416 8 38	
2	10. TOTAL	. 8416 MILL ION HOURS	JOH HOL	RS	9 FF	FAILURES	RATE 1S	8 FAIL/18**GHRS
784	JFET. NCHAN		. 990	.0208	9	3.0	.3	GH LOWER 066 .0299 8 38 .3
1	11. 10	.0208 MILLION HOURS	TON HOL		9 F	0 FAILURES		8 FAIL/18**6HRS
	IEFT.NCHON	SAT ANAL TAS	058E	.82585		25	.635	
CA1	IFFT, NCHON	SAT JANTX		87516		52	710.	
5.7A	JEET. HCHAIL			19591		52	. 625	
585	JEET.NCHAN	SAT JANTX	. 38EA	81253		25		
664	JFET.NCHAN	SAT JANTX		61819.		22	.873	
965	JFET.NCHAN	SAT JANTX		.012526	0	52	••	
637	JFET.NCHAN		858E .	92595		25	.05	
629	JFET.NCHAN	SAT JANTX		96263		22	. 993	
682	JEET. HCHAN	SAT JANTX	. 3850	. 82585			10.	
i		.306886 MILLION HOURS	TON HOT	IRS	9 F	FAILURES	RATE 15	RATE IS 8 FAIL/10**6HRS
225	577 JFET, NCHAN, DUAL	SAT JANTX 858E . 8581	058E	.0501	0	25	.1.	. 1
*	13. TOTAL	.8581 MILLION HOURS	TON HOL	IRS	9 FF	FAILURES	RATE 15	8 FAILURES RATE IS 8 FAIL/18**GHRS
583	JFET. PCHAN	SAT JANTX 858E .02585	058E .02505			25	.1	
*	14. TOTAL	. 02505 MILLION HOURS	10H HOL		9 F	FAILURES	RATE 15	9 FAILURES RATE IS 8 FAIL/10***GHRS
464	NPN. GER	NS JAN 832AG . 859	832AG .859		9	40	.5	9 48 .5
	15. TOTAL	.059 MILLION HOURS	TON HOL		9 F	FAILURES	RATE 1S	8 FAILURES RATE IS 8 FAIL/18***GHRS
485	NPN, GER, SU	GF JAN 8558 4.851	8558 4.851		9	38 14	.75	6 38 IU
t	16. TOTAL	4.051 MILLION HOURS	10H HOI		6 F	FAILURES	RATE 15	1.48112 FAIL/10m6HRS
80	HPN. GER. SU HPN. GER. SU	SUB JAN SUB JAN	9518 9518				.2	.2
	17. T	1632.22 MILLION HOIRS	ION HOI		6 F	H	RATE 15	PATE 15 .367597E-2 FAIL/10**6HRS
6	HPN.SI		832AG 8.594			48	.3	9 48
	18. TOTAL	8.594 MILLION HOURS	ION HOL		9 F	FAILURES	RATE 15	8 FAIL/18**6HRS
Ē	71	AL CONTA			-			

ENTR	ENTRY PART DESCRIPTION									
36	NPN.SI.LIN	æ	JANTX	2		•	8	554. 486V	.264363V	
192	HPH.SI.LIN	=	THE	2	8	•	32	2.934.56V	911	
348	NEN.SI.LIN	=	SANTA	2	8.		8	674.48ev	. 994 55V	
253	NEH.SI.LIN	=	MATA	2	198.	•	2	2.93U.50V	9114	
9	MH.SI.LIN	=	THE	2	999.		B	2.94 U. 50 V	. 962 916 V	
2	KPN.SI.LIN	=	SPHTX	2	100.	•	32	2.9 U. 50 V	.03016 V	
28	MPH.SI.LIN	=	SAME	2	8	•	8	2.9 U. 50 V	9.0°	
99	NEW SILLIN	=	XTHAL	2			33	4.1 L. 8 V	. 685 195 V	
37	NEH.SI.LIN	•	SPATX	2	188	•	20	3.96 C. 46 V	V 261 195 V	
152	HPN.SI.LIN	=	SPATX	2	. 864	•	23	4. IU. 40V	. 116.	
97	HPH.SI.LIN	•	XTHAL	2	.00.	•	*	2.9 U. 50 V	. 662 62 V	
	HFN.SI.LIN	ē	XTHE	2	999	•	*	115.0 U. 00 V	.85255 V	
962	HPH. SI.LIN	ē	XTHAL	945	.004	•	8	2.93U.58V	. 002 016V	
8	NEW, SI.LIH	ē	THE	8	. 964	•	2	2.93 U. Se V	9.611 .	
29	NPH, SI, LIN	ē	STATE	2	. 664		8	4.1 5. 8 4	. 811145 V	
10	HPN.SI.LIN	ē	XTM	2	. 664	•	20	> 86 75 5.	» I10.	
10	NPH.SI.LIN	ē	SAMTX	2	. 964	•	22	2.9 U. 50 V	. 862232 V	
93	NPN.SI.LIN	ē	JAHTX	2	.004	•	33	120 U. 406V	. 91, .363 V	
69	MPH.SI.LIN	•	XTM	5	198	•	20	2.93 U. 50 V	9.611 V	
	NPH.SI.LIN	•	STHRE		. 964	•	8	187 U. 486 V	. 811363 V	
92	HPH.SI.LIN	ē	SPHTX	2	8.	•	55	2.9 W. 50 V	9.6186 V	
263	NPN.SI.LIH	•	SPHTX	540	. 664	•	33	2.93U.58V	.002016	
2	NPH.SI.LIN	ē	SPATZ	540	900.	•	33	3.27 U. 40 V	. 186 195 V	
247	HPH.SI.LIN	ē	JAMTX		.004		55	88U. 158V	.649683V	
255	NPH, SI, LIN	•	JAHTX	045	. 864	•	55	2.93W.58V	.864876V	
I	NFH.SI.LIN	=	MATA	2	. 98.	•	53	128 U. 486 V	. 121363 V	
252	NPN.SI.LIN		JAMTX	943	. 964		55	4.1U.40V	.885195V	
96	MPN.SI.LIN	æ	SANTX		. 664	•	53	115.8 W. 88 V	.831845V	
962	NPN.SI.LIN	a	SHIT	945	. 964	•	52	284	>1 ·	
2	MPH.SI.LIN	RI	SANTX	945	199	•	55	2.9 U. 50 V	. 002 11 V	
249	NEN.SI.LIN	ē	MATA	243	. 664	•	22	26		
*	HPH, SI, LIN	ē	THE	5	. 864		55	185 L. 86 V	.136363V	
147	NEN'SI'LIN	ē	MATA	045	.004	•	22	120 U. 400 V	.12284 V	
	NEN.SI.LIN	æ	MATA	045	. 884	•	20	115.8 U. 86 V	.825, .836V	
992	HPN.SI.LIN	ē	THE	945	. 664	•	8	3.984.48V	.887195V	
22	NPH, SI, LIN	£	JANTX	2	. 884		22	2.9 W. 50 V	9.63 4	
	NPN.SI.LIN	ē	JANTX	845	999	•	22	2.9 W. 50 V	9.611 V	
244	NPN.SI.LIN	ē	JANTX	645	.004		22	85W, 486V	.814363V	
564	NEH.SI.LIN	ē	THE		. 964		22	3.98W.48V	.012145V	
292	NPH.SI,LIN	ē	SAHTX	945	. 964		32	2.93W.50V	838V	
8	MPN.SI.LIN	ē	SPHTX	945	999	-	23	187 U. 486 V	.8655V	
96	MPH.SI.LIN	æ	JAHTX	945	*00.	•	22	2.9 W. 50 V	9.63 4	
	HPH. 91.1.1M	4	SPHTX	845	866		22	2.94 W. 58 V	9.63 V	
254	NPN.SI.LIN	H H	JAHTX	945	. 994		55	2.93W.58V	91887	
14	NPN.SI.LIN	I H	JANTX	845	.004		52	3.2 W. 49 V	.814145 V	
652	NFH. SI.LIN	æ	JANTX	945	.004		22	3.98U.48V	.012145V	
***	****	Antonia koje sk		Appropriate Approp	SAN KANADA				KARASKA KARAKA WANASE	****
	19. TOTAL		L KAK MI		20170				-	C22666 F011 /104

2320	ENIRI PHRI DESCRIPTION	au s		ENT GOMETIT SHEE				2011	2000	
	NPN.SI.LIN	₹	JANTX	926	. 861332			.24		
	NPN.SI.LIN	€	MATA	926	. 996148		30	3.		
	NPN.SI.LIN	\$	JAHTX	926	. 662111	•	30	.36⊌		
	NPH. SI.LIN	€	SPITX	926	. 888888		30	.24		
	MPN.SI.LIN	2	SANTX	926	. 866187	•	36	. S.		
	NPN.SI.LIN	3	JANTX	920	. 000296	•	30	3		
122	NPN.SI.LIN	8	JAHTX	926	. 866266		36	.5u		
4	20. TOTAL	. 965	985228 HI	MILLION HOURS	OURS		FAILURES	ES	RATE 15	8 FAIL / 10**6HRS
1	NPN.SI.LIN	95	JAHTXV	9519	4659.65	-	=	36814J. 68V	5. S.	****************
	M. 41 . 1 IN	5	PATMAI		429 B46		:	200HEL 15V		
7 13	NPN. ST. LIN	8 8	IMITA		5946. 28			1. BU. 45V		
-	NPN.SI.LIN	3	JANTXV		788.85	~		1.24.86V	: v ;	
	21. TOTAL	11623.7		MILL ION HOURS	OURS	7	FAILURES	ES	RATE 15	.344123E-3 FAIL/10**6HPS
100	MPN.SI.LIN	5	185	9229	16.882	2	36	3	552	
IA	NPN. SI.LIN	3	18	9558	. 532	•	30	300	25-5	
	MPH.SI.LIN	3	*	9229	. 875		30	2	25	
353	MPN.SI.LIM	5	*	9528	1.867		36	705	28-5	
169	MPN.SI.LIM	3	*	954	.056	•	30	2		
135	NPN.SI.LIN	5	1	8528	5.496	-	36	2	.255	
160	HPH, SI.LIN	3	F	9228	1.795		36	2	.255	
ni.	MPN.SI.LIN	3	185	8559	3.686		33	17.50	255	
30	NEW, SI.LIN	*	*	849A	3.61778		35		5	2
100	NEH. SI, LIN	3	185	8559	7.339	-	2	2.5W	285	
933	NPH, SI, LIN	3	SPI	949A	1.91982	-	32		.5	
400	NPN.SI.LIN	5	181	855A	. 964	•	33	761	.255	
Yang	NPH.SI.LIH	5	H	855A	23.086	•	2	710	.255	
13	NPH.SI.LIH	*	H	855A	1.184		33	11.60	.255	
10	MPN.SI.LIN	5	¥	9228	101.85	•	33	2	.25-15	
1	NPN.SI.LIN	5	- Ter	855A	96.	•	R	300	.255	
1	NPN.SI.LIN	5	H,	8558	.732	•	2	2	.255	
M	NPH. SI.LIN	3	- Jan	955A	1.054	-	33	3	.255	
19	NPN.SI.LIN	5	JAN	8498	9.20295	9 .	2	₹	s.	
	22. TOTAL	189.	80.661 MI	MILL TON HOURS	OURS	36 F	FAILURES	ES	RATE 1S	. 199268 FAIL/18**6HRS
	MPN.SI.LIN	3	JANTX	051C	.127		52	150V	.3	
186	MPN.SI.LIN	3	JAHTX	9510	700.	•	22	20.	.3	
	NPH, SI, LIN	5	SANTX	9510	.15	•	2	.90		
500	NPN.SI,LIN	*	SANTX	646	3.584		4		5.	
900	NPN.SI.LIN	*	MATA	646	1.992		4	4 W. 288 V	S.	
1	* Charles and Char			****	rate and a second	SAN SAN	STATES AND IN	DESCRIPTION STATES AND STATES		*******************
		-			-	•	-			

378	NPN.SI.LIN	5	LOUER	9510	.214	•	2	1590		
822	NPH. ST. LIN	15	LOLER			•	25	201,1		
484	NPN, SI.LIN	9	LOUER	053	116	128	55		. 0.	DUAL
	26. TOTAL	116.	116.285 MILLION HOURS	ILL ION	HOURS	128	28 FAILURES	7ES	PATE 15	1.83195 FAIL/18**6HRS
782	MPN. SI.L.IN	E.	JAN	996	. 6833		36	8881.188V	******	****************
363	NPN.SI.LIN	5	THE	954	96.		30	1151	. 8	
356	NPH, SI, LIN	5	JAN	954	911.		36	.30	8.	
357	NPH.SI.LIN	5	JAH	954	90.	•	30	70.	8.	
328		5	THE .	954	. 842	•	36	2	8.	
	25. TOTAL	.3	3613 MILL ION HOURS	ILL 10N	HOURS	0	FAILURES	ES	PATE 15	8 FAIL/18 MAGHES
963		55	XTMAL XTMAL			• •	22	159U.88V 2001J.15V	.3	
i	26.TOTAL	1.2	1.2495 MILLION HOURS	ILL 10N	HOURS	9	FAILURES	AILURES	PATE IS	8 FAIL / 1846HRS
373	NPH.SI.LIN	NS	JANTX	9510			35	.94	.3	****
375	NPN.SI.LIN	£	JAHTX				35	158U	.3	
37.1	NPN.SI.LIN	¥	JANTX		100	•	32	. Bu	.3	
	27.TOTAL		. 117 M	MILLION HOURS	HOURS		FAILURES	ES	PATE 15	8 FAIL / 10**GHRS
369	NPN.SI.LIN	R	LOWER	9510	969.	•	33	156W	.3	
377	HPH.SI.LIM	¥	LOWER	9510	91		32	200	E.	
100	28.TETAL		.131 MILLION HOURS	ILL 10N	HOURS	6	FAILURES	ES	RATE 15	8 FAIL/10**6HRS
199	NPH.SI.LIN	SAT	JAMTX	9950	. 03477		22	250HJ, 68V	.69	
653	HPH.SI.LIN	SAT	JANTX	9296	19860		2	200mJ. 15V	. 035	
245	HPN.SI.LIN	SAT	JAHTX	9286	.01730	•	2	360TJ. 66V	8.	
225	HPH.SI.LIN	SAT	JAHTX	958E	. 02608	•	2	16.96V	. 653	
525	MPN.SI.LIN	TAS	X TAN	9284	40.864	•	2	500MJ. 50V	-	
235	MAN SILLIN	100	1	9500	76 6 6		C X	VOO. LINES		
829	NPN-SI-LIN	SAT	14	858E	37818		2 2	1. Bld. 45V	. 812	
286	HPH.SI,LIH	SAT		858E	*		2	10, 15ev	1	
299	HPN. SI.LIN	SAT		958E			2	200rtu. 15V	.892	
219	NPN-SI.LIN	SAT		958E	.14776		22	288MJ. 15V	. 983	
683	NPH.SI.LIN	SAT		958E	.01738		52	1.8W.45V		
524	NPH.SI.LIN	SAT		858			52	200MJ. 15V	-:	
909	NPH, SI, LIN	SAT		959E	. 83477		52	288rts, 15V	260.	
929	MPN.SI.LIN	SAT	34	858E	. 03477	•	52	3.5W.35V	750.	
615	NPH.SI.LIN	SAT	SANTX	959E	. 02122	0	25	115W.68V		
	71	-		-			-			

CONTENTS																		0 FAIL/18==GARS												.243121E-2 FAIL/10#6HFS	STRESS ASSURED	.895615E-2 FAIL/10wcHRS	PUR IS GIVEN PER SIDE PUR GIVEN PER SIDE	B FAIL/18446HRS
STRESS	.622	-1	3.		1	- 1080 July	181	720.		950	-	8.	. 162	8.			1	RATE 15	.3		m: I		? .		r.			•	'n	RATE 15	.5	RATE 15	100. 816.	RATE IS
TEMP RATING	300TL.	36011.	300 M. 30V	2001,000	500TU. 86V	36814, 68V	600ru. 28V	288MJ. 15V	. 686FLJ. 28V	20010, 15V	10.150	300FL. 15V	24.667	250FL. 60V	10.00	Treme Co.	2001L. 15V	FAILURES	3	365	2	3 :	8 3	3.	326	3.	, ;		17	FAILURES		FAILURES	300TL.60V 250TL.60V	destatut en
	2	21	01		25	2	2	2	2	52	2	2	2		6 1	3	32	B FAIL	33			81		200	R	R :	R #			B FAIL	1 35	FAIL	22	P FAIL
HRS#10+6 FAIL	69000	.20061	200		4.072	.63477	.82688	.13838	4.872	. 84346	69999	.01738	. 04243	.06954	. 62560	1010	. 62688	OURS	2.369	2.369	68.701	178.368	284.28	912.865	9.476	36.836	2.369	150	28.428	OURS	111.6551	OURS	.069692	OURS
SACE	9586	920	8		38	9586	3950	958E	258	958E	9505	958E	958	9296	2		958	MILL TON HOURS	9318	3	25	8	8 5	92.69	8518	25			9518	L 10N H	9439	HILL ION H	88	MILL ION HOURS
ENV QUALITY SRCE	SAT JANTX	SAT JAHTX	SAT JANETX	SAT JAMES	SAT JANTX		SAT JANTX	SAT JANTX	SAT JANTX	SAT JANTX	SAT JANTX	SAT JANTX	SAT JAMTX	SAT JAHTX	SAT JANTX	XING LAG	SAT JANTA	257.789 HIII	SUB JAH	SUB JAN				Sue Jan	SUB JAH	Sue Jes			Mer 875	3296.54 MILLION HOURS	Ę	111.655 MILLION HOURS	SATHAL TAS XTHAL TAS	. 968892 HII
ENTRY PART DESCRIPTION	NPN.SI.LIN	HEN.SI.LIN	HPH. SI.LIN	MPH.SI.LIN	MAN SILLIN	HEN-SE-LIN	NEW ST. LIN	NPH-SI-LIM	HPN.SI.LIN	NFH. SI.LIN	NPH. SI.LIN	NFH.SI.LIN	NEH.SI.LIN	NEH-SI-LIN	HEN.SI.LIN	MAN SI'LIN	HEN.SI.LIN	29. TOTAL	HPH.SI.LIM	HEN.SI.LIN	HEN.SI.LIN	HEN.SI.LIN	MAN SILIN	HEN.SI.L.IN	HEN.SI.LIN	NEW SI'LIN	HEN.SI.LIN	MAN.SI.LIN	MAN.SI.LIN	30. TOTAL	NPN.SI.LIN.DUAL	31. TOTAL	HPH. SI.LIN. DUAL	22 TOTAL
ENTRY	*	366	1	533				595	\$25	634	269	636	652	3	929		528		332	329	364	333	3 :	7	2	125	363	33	2 %		8		12%	****

2	ENIRT PIRT RESCRIPTION									SCHOOL SCHOOL SCHOOL	
1	NEW, SI. LIN, DURL, HATCHED	5	4		669	3.01778		R		.5	The second secon
	33. TOTAL	3.6	3.6177		MILL ION HOURS	JRS	•	FAILURES	ES	RATE 1S	0 FAIL/10wGHRS
	HPH. 51.4 IN. PUR HPH. 51.4 IN. PUR HPH. 51.4 IN. PUR	555	1 2 2	•••	888	7.67928 95991 95991	N00	222	₹ 8	ນ່ ໜ່ ໜ່	
	34. TOTAL	9.5	9.5991		MILLION HOURS	JRS	2	FAILURES	ES	RATE 15	. 288353 FAIL/10**GHRS
	164.51.PUR 184.51.PUR	35	44	••	955A	5.344 .096		នង		.255	
	35. TOTAL	٩	6.44		MILLION HOURS	IRS		FAILURES	ES	RATE 1S	0 FAIL/18wGHRS
	HPH.SI.PUR HPH.SI.PUR HPH.SI.PUR	555	LOLER		222	. 042 . 063 . 628		222		6.6 .6	
	36. TOTAL		. 153	MILLION	2000	HOURS	•	FAILURES	£S	RATE 15	0 FAIL/10mGHRS
	IPh. 51. Put IPh. 51. Put IPH. 51. Put	222	SAT JEST X		555	.665 1.376 5.823		222	11.64.48V 484.186V 534.88V		
	37.TOTAL	7.	7.878	וורו	MILLION HOURS	JRS		FAILUR	Florence of the Carlo	RATE 15	0 FAIL/10m6HRS
1 12	NPH. 51. SU	ē	SPATX	°		4		â	3.	s.	
	MPH. 51.5U	= :	SANTX	•	\$:	18.994	- (£ :	.364	e.	
	35.15.19	Ē ā	X X X		3 9	20.4	N 6	9 9	25.		
	NPN. SI. SU	=	STARL	•	•	4.618	, m		364		
	MPH, SI. SW	æ	SPHTX	•		962		ę	1884. 488V	8.	
1	MPH. 51.5U	æ	SANTX	•	Ç	100	•	8	1.37 U.40 V	9.9128 V	
	NPH. 51.5U	=	SPATX	•		2		8	1144.1587	VE80770.	
130	MPH. 51. 54	=	THE S	•	9	2		8	1.3 W.50 V	>	
	New SELSON	= =	X NEW Y		6 1			8	1.37 U. 68 V	9.6012 V	
	M. 1.51.50	= ;		Ď (2	8		R	A 00 .0	A	
100	MPH. SI.SU	=	MAL		548	198		200	1.37 4. 40 V	.862145 V	
1	36.TOTAL	53.	53.278 MILLION HOURS	1	ON HO	IRS	9	FAILURES	ES	RATE IS	. 112617 FAIL/18***GHRS
1	WPH.ST.SU	3	JAHTX		926	.000592		30	.36W	2.5	
1	MPH. ST. SU	3	JAHTX		926	. 866187		30	3.	.3	
	MPH. 51.5W	3	JANTX		926	. 886148		38			
	NPH.51.5U	1	TONT		-						

19.17 19	39.70TR.	5	JAHTX	958	014159	•	5			
				3				.54	.3	
	3333	10.	. 81781 HIL	MILLION HOURS	OURS	9 FF	FAILURES	S	RATE 15	9 FAIL/10#6HRS
	3.35	3	JOHNTAV	9519	1074.61		10	75U.98V	.5	
	33	8	JAHTXV	9518	662.679		•	75W.98V	5.	
	3	8	JAHTAN		197.461	•	•	125U.98V	s.	
	the state of the s	3	JANTAN	651A	4226.82		•	368HJ. 28V	.5	
	40. TOTAL	6e71.57	2002	MILL ION HOURS	OURS	9 FF	FAILURES	S	RATE 15	8 FAIL/18 WEHRS
2202 3	ns.	5	SP	4	2759	555	22	1.0	.3	
	3	*	=	44	2759.	351	22	22 u	.3	
	25	*	=	9559	858.145	4	38	2	.255	
	3	6	¥	9559	.946		36	2	.255	
	35	*	181	9558	4.124	2	38	1564	.255	
1 1071.51.	35	3	785	9220	*		2	38.	.255	
M.S.	3	3	785	9556	346.		20	1787	.255	
	3	5	786	9220	31.77		36	752	.255	
7 MM.SI.	2	3	185	8558	3.765	2	36	2	.255	
117 HPH. 51.	2	*	1	-	14.39865		33		5.	
-	3	*	*	B550	.24		20	7051	.255	
-	2	*	-	-	395.1339	•	33		5.	
-	3	*	=	-	16656.	•	33		٠.	
121 HPH-51.5	25	8	*	849	1.91982		2		s.	
118 NEW . 51.9	26	*	¥	-	8.63919	•	R	3.	5.	
-	*	5	¥	8498	828.1851	•	22	3.	5.	STRESS ASSUMED
-	2	*	¥	6559	517.54	9	2	7001	552.	
-	2	*	*	9558	196.	•	R	3	552.	
-	3	3	¥	467	.1392	-	R		S:	
-	3	*	1	9228	3.736	•	2	75	.25.5	
-	3	8	*	8558	1286.486	~	R	212	552.	
42 MTH. 51.	2	8	F	6495	286.4324	•	2	.364	.5	STRESS ASSUMED
B HPH.SI.	3	*	¥	949A	146.7453	2	32		.5	STRESS ASSUMED
	2	5	ŧ	9559	. 863	•	K	752	.255	
•	3	3	¥	849	454.8287	24	2	.364	•:	STRESS ASSUMED
116 MPN.SI.	2	4	Ŧ	8498	16656.	•	R		S.	
0.00	2	5	F	450	211.2393	•	2		•	
	25	4	¥	949A	589.2165	6	32	.364		STRESS ASSUMED
-	25	*	THE,	8498	193.1331	~	2		s.	STRESS ASSUMED
321 NPN.SI.SU	75	45	Jan	8559	.967		35	750	.255	
	41.TOTAL	1127	1271.3 MIL			1868 FA	FAILURES	S	RATE 1S	.948441E-1 FAIL/18**6HRS
274 MPH. SI.SU	Su	9	JAMTX	9510	.374		52	2U	.2	
		*	XTMO	9510	986		X			
15 15 NON 512		3 8	-	3 4			3 8		, .	

268 272 273 274 198 198 1187 1187 1187										
	NPN.SI.SU	*	JANTA	9510	.862		2	"Su	.2	
	MPH. 51.5U	5	JAHTX	9510	.241		52	.54	.2	
	NPH. S1. SU	3	JANTX	9510	98.		52	38.		
	NPN.S1.9W	3	JAHTX	9510	. 848		52	2	.2	
	MPN. 51. SW	5	JANTX	646	75.976	•	4	.36 ₪	5.	
	MPH. 51.5W	3	JANTX	649	3.776		£	3 0.	·.	
1	NPH. 51.5W	8	JANTX	9	69.688	-	4	.s.	σ.	
	MPH. 51.5U	5	JAMTX	949	3.976		4	.36 ₪	s.	
	MPN.SI.SU	5	JAHTX	949	58.472	~	4	.36 ₪	5.	
	MPH. SI. SU	5	THU	649	1.192		Ą	1884. 488V	s.	
1	42. TOTAL	214.	214.862 MILLION HOURS	LION	DURS	3 5	FAILURES	ES	RATE 15	.139625E-1 FAIL/18**6HRS
	NPN.SI.SU	5	JANTXV	896	3.56390		36	.Su	.4.3	
•	43. TOTAL	3.5	3.5639 MILLION	MILL ION HOURS	FOURS	8	FAILURES	ES	RATE 1S	B FAIL/10**6HRS
	MPN.SI.SU	GM	JAN	954	.396		38	10.	. 8	
R.	WHY. SI. SU	5	185	954	.035		30	.30	8.	
	WHY. SI. SW	5	THE S	854	.167		36	25W		
	NPN.51.5U	5	185	954	.486		36	.36U	8.	
E.	HPH.SI.SU	5	THE,	924	.472	•	30	38.	8.	
16	MPN.SI.SU	5	HE,	854	3.117		38	J.S.	•	
	44.TOTAL	4.	4.673 MIL	MILLION HOURS	OURS	9 6	FAILURES	ES	PODDOPPOPARADOPPO	PRINCIPAL PROPERTY OF THE PROP
	NPN.51.5U	5	JANTX	990	8.122		36	500MJ, 46V	.5	
	NPN.51.5U	5	SPHTX	998	.0416		38	888HL, 58V	5:	
	NPN.SI.SU	5	JAHTX	996	.8416		36	25W, 68V	.5	
	45.TOTAL	8.2	8.2052 HILLION HOURS	L10N H	OURS	9	FAILURES	ES	RATE 15	9 FAIL/10 WASHRS
	NPN. 51. SU	F	LOVER	954	3.255		38	. Bu	8.	
	MPN. 51.5U	5	LOLER	990	.1562		36	318MJ. 48V		
B	HPN, 51.5U	5	LOWER	954	2.341		38	20.	9.	
ď,	MPH. 51.5W	5	LOUER	456	.014	•	30	.36⊌	0.	
	WAY.SI.SU	5	LOLER	924	2.36		30		8.	
	66. TOTAL	9.1	9.1262 MILLION HOURS	L 10N H	IOURS	9	FAILURES	Es	RATE 1S	8 FAIL/18**SHPS
575	HPH.SI.SW	NS	JANTX	851C	.679	0	35	80m	.2	*************
	HPN.51.3W	SH	JANTX	9510	.02		35	2	.2	
160	NFH.51.5W	RS	SHITX	9510	.35		35	.36.	.2	
	HPH. SI.SW	RS	JANTX	9510	.826		35	₩.	.2	
11/	MPN.51.5W	¥	JAHTX	9510	.639	0	35	99m	.2	
	WPH.SI.SW	NS	JANTX	9510	. 151		35	20	.2	
1	HPN.SI.SIJ	£	JANTX	851C	. 105		32	.5u	.2	
	47. TOTAL	******	77 MI	27 MILLION HOURS	OLIPS	N N	FAILURES	ES ES	PATE 15	PETER BETT I DESCRIPTION

MPN.51.SW		SAT	JAHTX	958E	.82688		52	386rtd. 38V	-	
WPN. 51.5W		SAT	JAHTX	9850	.1384		25	300MJ. 75V		
NPN ST. SIL		SAT	JANTX	958E	. 88435		52	388rts, 38V		
WPH. SI.SW		SAT	JAHTX	9858	. 885384		25	254J. 188V	.2	
NPH. SI.SU		SAT	JANTX	958E	.3738		25	588MJ, 48V	.972	
MPH. 51.5W		SAT	SAT JANTX	958E	.61713		52	368MJ. 38V	.695	
NPH.SI.SU		SAT	JAHTX	958A	22.396		52	368MJ. 48V		
NPN.51.5W			JANTX	BSBE	. 668692		25	388HJ. 38V		
NPH. 51.5W		SAT	JANTX	958E	. 83842		52	586MJ. 48V	. 833	
WPN.SI.SW			JAHTX	958E	.01738		52	368HJ. 38V		
WPN.ST.SW		SAT	JANTX	958E	.14776		23	369MJ. 58V	.132	
NP11.51.5W		SAT	SAT JANTX	858E	69888		25	360FLJ. 40V	.053	
NPN. ST. SIL		SAT	JANTX	858E	.84243		23	15W.88V	.125	
MPN ST. SL		SAT	SAT JAHTX	958E	.03477		25	500MJ. 40V	. 868	
NPN. 51. 51		SAT	JANTX	858E	.83477		23	360MJ. 40V		
MPN ST. SL			JANTX	858E	96660.		23	588MJ, 48V	. 635	
NPH. ST. SW			JAHTX	958E	.62122		23	15W.88V		
MPN ST. SL			JANTX	BSBE	.63911		22	59974J. 48V		
NON ST. SIT			SANTX	BSBE	. 88257		25	388HJ, 45V		
Mon of Cit			SOT JONTX	PSAF	24339		2	36011J. 38V	.825	
Me 12 1.30		Too	IONTY	PERE	113			SERVELL ARV	. 873	
MEN. 51.50		100	STATE TOO	9800	02122		3 %	151. 887		
Mr. 51.50		Too	TONOT	OSOE	99496		3 %	ISIA. ARV	122	
Me. Is a Man		Tas	TON	PSAF	M3477			SAGIEL 3AV		
MC.15. HAM		Tes	TANDE	PSAF	81718		2	15W.80V		
ME ST. SIL			SAT JANTX	9286	.01961		32	15W.88V	7	
ME CI CHAN		Tas	JANTX	BSBE	.12169	0	25	360MJ, 48V	. 987	
HON SI SI		SAT	JANTX	BSBE	.86954		25	360MJ, 38V	99.	
WEN. 51.5W		SAT	JANTX	058E	.01738		22	588MJ. 48V	.885	
WS.18. NAM			JAHTX	958A	6.198		23	388MJ. 15V		
NPN. 51.5W		SAT	JANTX	958E	.84781		25	500rtu, 40V	.12	
NPH. 51.5W		SAT	0.145	958E	.61738	•	52	500PLJ, 40V	.058	
MS.18.HM	The state of the s	SAT	JANTX	958E	. 88435		22	300MJ. 30V	. 63	
48.	48.TOTAL	31.8	31.8322 MILLION HOURS	L10H H	DUPS	. 0	FAILURES	ES	PATE 15	8 FAIL/18**6HRS
TAT HEN. ST. SIJ	*********	SUB	JAN	9518	518 824.412		35	us.	.2	
NFN. ST. SL		SUB	JAN	9218	11.845	-	35	25W	.2	
WP11.51.94		SUB	JAH	9518	82.915		35	.1251	.2	
NPN. 51.51		808	JAN	851B	66.332	0	35	11		
NFH. 51.5W		808	JAH	951B	367,195	-	35	.6W	.2	
112.12.4M		SUB		8158	71.87		35	.94	2.	
MP. 31.5M		808		9150	1762.536	6 5	35	M8.	.2	
NPH. ST. SU		SUR		9150	7.197	0	35	.84	.2	
NPH. 31.5W		SUB	JAN	8150	18.952	•	35	.30	.2	
NPH ST. SM		GITS	1014	9510	212 446		36	21.1		
								-		

-	ENIRI FIRE ACCRIFIUM	ENT MONETH SHIPE	-						
	NPH.SI.SU	SUB JAN	82.0	7.107	•	R	7	7	
2.5	MPH. SI. SU	SUB JAN	6218	284.29	• ~	2 22	§ §	vi vi	
-	49. TOTAL	3901.74 MILLION HOURS	L 10N	OURS	91	FAILURES	ES	PATE 15	.410073E-2 FAIL/10wGHRS
327	NPH.SI.SU	SUB JANTX	9518	9.476	•	35	.36U	.2	
-	50. TOTAL	9.476 MILLION HOURS	L 10N	OURS	•	FAILURES	ES	RATE 1S	0 FAIL/10**GHRS
336	NPN. 51. 5U	SUB LOLER	9218	28.428	•	33	.95	.2	
333	MPH. 51. 9U		9318	26.059	•	R	3 .	.2	
33	FR. 51.54	SUB LOLER SUB LOLER	92 8	9.476	• •	22	2 F.	, r,	
1	51. TOTAL	106.605 MILLION HOURS	T 10H	OURS	•	FAILURES	ES	RATE 1S	0 FAIL/18m6HRS
20	NPH.SI.U	ATHAL IA	9	188.	•	8	.25 U. 15 V	. 63 64 V	
19	HPH. 51.U	ATMAL 1A	2	8	•	8	2.93 U. 50 V	9.8858 V	
2	NFN.SI.U	ATHAL IA	2	1	•	8	4.1 C. 350 V	. 961411 V	
63	NEH.SI.U	ATMRL IA	2	8	•	8	2.93 L. 45 V	. ees 116 v	
	21.0	XING IS	8			8 1	135 E. 136 V	× 2085.	
,	20.10.10.10.10.10.10.10.10.10.10.10.10.10	ATMO: 10	8 5		•	8 8	1.30 %	. 23 23 V	
2	New 31.0	AI JOHTX	2			3 8	3.64 H. 350 V		
	HPH.SI.U	AT JAMTX	3		•	8	4.34.35ev	.889. 4117	
	WPH.SI.U	AT JOHTX	2	198	•	8	24.5 U. 140 V	. 96 16 V	
	NFN.51.U	AT JOHNTX	2	18.		8	2.15 U. 50 V	. 68424 V	
25	NPH. 51.U	ATHRE IA	2		•	2	1 i i i i i i i i i i i i i i i i i i i	.8432 V	
	NPN.SI.U	ATHAL IA	2	2	•	8	.58 U. 68 V	8.623 V	
	1.31.0	XIMIN IN	2			8 1	3.36 6. 48 4	V 6118.	
2 8	D.18. F.	XING IN				8 2	. Sr 6. 30 v	2 2	
	NPN.SI.U	AT JANTX	2	700		3 5	2.93U.50V	A. 30V	
	NPH.SI.U	AI JAMTX	5	. 964		8	24.5 U. 140 V	. 98 16 V	
62	NFH. 51.U	AT JANTX	2	. 984	•	8	2.93 W. 45 V	. 865111 V	
	MPH.SI.U	ATHAL IA	5	. 864	•	20	2.93 U. 50 V	9.623 V	
ī	NPH, SI, U	AT JANTX	4	. 964	•	25	19.06 W. 140 V	.849821 V	
	NPH. SI.U	ATHAT	4	. 964		32	.823 U. 15 V		
29	NPN, SI.U	AI JANTX	945	. 964	•	25	4 U. 158 V	. 6351 V	
2.4	52. TOTAL	.092 MILLION HOURS	L 10N	OURS	6	FAILURES	53	RATE 15	0 FAIL/10***GHRS
188	188 NPN.SI.U	AU JANTXV 059	959	8.388	0	98	.5u		
100	. 46.00	8.388 MILLION HOURS	MILLION HOURS	DIIDE					
	30.101ML								

ENTRY THE PEDENT LIES		ENV GURLITY SKLE	SRCE	HRS#18+	S FAIL	E P	HRS#1846 FAIL TEMP RATING	STRESS	CONTENTS
487 NPN.SI.U	8	JAHTAV	8258	8578 7.546	9	37			
SA. TOTRL	7.546	MILL 6	MILL ION HOURS	URS	9 F	FAILURES	5	RATE 15	8 FAIL/10**6HRS
725 NPN.SI.U	GF L	LOUER	663	2.95	13	36		8.	PLR
	- 5	LOUER	963	7.54	88	36		.3	
T	1 55	LOUER	963	62.39	13	36		-	1
	_ 	LOWER	963	4.12	6	8		v: ·	Ž
	- 	OWER	963	5.96	6	36		٠.	
716 NPN.SI.U	 	LOWER	963	24.39	-	30		.2	A STATE OF THE PARTY OF THE PAR
722 NPH. SI.U	- 5	LOWER	963	2.96	91	36		.5	25
721 NPN.SI.U	٠ پ	LOWER	693	11.98	4	30			3
723 HPH.SI.U	٦ 5	LOUER	963	2.94	=	36		en:	2
	1 15	LOWER	653	1288	296	25		s.	SMALL SIG
233 HPN.SI.U	ے خ	LOWER	653	91		32		•:	DARL INGTON
U.12.NAN	b	LOUER	953	537	828	22		•	2
SS.TOTAL	L 1893.7	893.75 MILLION HOURS	ION H		1771 FI	FAILURES	S	PATE 1S	.935182 FAIL / 18***6HRS
28 NPN.SI.U	1	PLASTIC 053	653	3621	1398	55		. S.	SMALL SIG
NPH.51.U	٠ پر	PLASTIC 053	10.00	136	315	55		S.	PLR
56. TOTAL	315	3151 MILLION HOURS	10N H		1713 FI	FAILURES	S	RATE 1S	.543637 FAIL/10**6HRS
THE HPH. ST. U		LOLER	954	.139		30		8.	
	5	LOLER	954	920	•	36	The state of the s	. 8	DUAL
57. TOTAL	. 195	S MILL	MILLION HOURS	JURS	8	FAILURES	S	RATE 1S	8 FAIL/18***6HRS
595 NPN. SI.U	C TAS	STANL	BSBE	.02122		22	115W.66V	•	
396 HPH. 51.U	SAT J	MATA	9950	. 03477	•	2	225MJ. 40V	-	
573 NPH. SI.U	SAT	MIX	929E	. 82122	•	2	96W. 156V	-617	
Ī	L TAS	THE	958E	. 91961		2	15W. 86V	- 1	
	SAT	THE	3858	. 1273		G	10.86	76.	
543 NPN. SI.U	L TAR	X	300	1707		G	7537LL, 667		
0.16.14	7. 749	2	2000	84247		3 %	190	New York Street, South Section	
		X		. 83477		2 10	225FLI. 48V	ASSESS OF THE PARTY OF THE PART	
	SAT .	MATX	3950	13838		2	225FLJ. 68V	STATE OF STREET STATE OF STREET	
	SAT J	MHTX	9950	.61738		22	286TLJ. 38V		
	SAT J	MHTX	958E	19010.		22	53U, 86V		
	SAT	MHTX	952	316.33		23		۷.	
6 HPH.SI.U		JAHTX	958E	13907		23	225MJ. 68V	989.	
366 NPH. 91.U		MHTX	958E	.82122	•	52	3.5W.14V	.133	
-	SAT	JAHTX	959E	. 96954		22	225HJ. 68V	-	
614 MPN.SI.U		MATX	959E	.01738	•	52	225HJ. 48V	-	
17 NON C1.11	TAS	TANT	BSBE	5658		25	200rtu, 38V		

	= = = = = = = = = = = = = = = = = = = =	CO. JOHLA	3000	95256			7861 DBV	•	
*	2000	M				2	100		
	Mrn. SI. U	•	2000	-0000		g	A99 (ML)C22		
	MEN.SI.U		200	. 83477	D	9	2001 30V		
-	NFN. 51. U	SAT JANTX	BOBE	.01738	•	22	225FU. 48V		
929	NPN. 51.U	SAT JANTX	959E	.01738	•	52	225FLJ, 48V		
	11.15 HON	SAT JAHTX	958E	.82122		25	225FLJ. 48V		
	= 5	SAT JONTX	388	17878		2	225MJ. GRV		
		CAT INSTA	-	31316		*	200 112		
295	MPN.SI.U		9286	19610.		3 2	25U, 38V	161.	
1	on expensionate for fear and other despite	Interestrictions and selected	Table Sept.		nickter.	STATE STATE	**********	fotototototototototototototo	*****************
	58. TOTAL	318.456 MILL	MILL ION HOURS	OURS	-	FAILURES	ES S	RATE IS	.314815E-2 FAIL/10**6HRS
1	LEGE ST. 11	SUB TON	914	2771 50	*	4	*****	2	
25	NPN.SI.U	SUB JAN	914	414.381	=	4		. 2.	
	enceptation and a section of the sec	*******	-	***		****	****		*********************
	59. TOTAL	2785.88 MILLION HOURS	2	OURS	36	FAILURES	ES	RATE 15	.129223E-1 FAIL/10**6HRS
999	PNP.GER	NS JAN	832AG . 234	.234	6	8			
	60. TOTAL	.234 MILLION HOURS	MILL ION HOURS	DURS	8	FATLURES	ES	RATE IS	0 FAIL 10**6HRS
- 65230	PNP.GER.LIN	GF JAN	6558 7.9	8558 7.998		38	30 10		.255
	61. TOTAL	7.998 MILLION HOURS	TON H	DURS	0	FAILURES	FAILURES		RATE IS 0 FAIL/10**6HRS
298	PNP.GER.LIN	SAT JANTX 858E . 8138	858E	858E .81384		52	58U. 48V	. 963	医阿米尔氏试验检 计分类 化苯酚 化苯酚 化苯酚 医克克斯氏 医克斯特氏 医克斯特氏 医克斯特氏征 医二甲基甲基苯甲基甲基苯甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲基甲
	62. TOTRIL	. 01304 MILLION HOURS	TON H	DURS	60	FAILURES	FAILURES	RATE 15	RATE IS 0 FAIL/10**6HRS
478	PHP.GER.LIN PHP.GER.LIN PNP.GER.LIN		9518 9518 9518	18.952 371.933 2.369		***	8.5W .225W 90W	ni ni ni	
***	63. TOTAL	393.254 HILL	MILL ION HOURS	ILL ION HOURS	0	FAILURES	enokkatekke ATLURES	PRINTERS IS	PROFESSOR OF FAIL/18**SHRS
579	PHP.GER.SU PHP.GER.SU PHP.GER.SU	79 79 78 78 78	8558 6.36 8558 .846 855A 1.33	6.3 0 7 . 646 1.328		2 2 2	10 60U . 15AU		
	64. TOTAL	7.681 MILLION HOURS	ION HOURS	OURS		FAILURES		RATE 15	RATE 1S 0 FAIL/10**GHRS
465		GF JANTX	05 1C	. 895		25	25 100W	.2	
	65. TOTAL	. 895 MILL ION HOURS	HILL TON HOURS	OURS	0	FAILURES	ES	RATE IS	FAILURES PATE IS 8 FAIL/10**GHRS
479	479 PNP.GER.SW 466 PNP.GEP.SU	GH JAN 854 .842 GH JAN 854 .167	854 854	. 84 2 .167	00	30 1991 30 1891		8 . 6.	e.
		.289 MILL	MILL ION HOURS	DURS	0	FAILURES		RATE IS	8 FAIL / 10**GHRS

457 PMP.GER.SU 468 PMP.GER.SU 464 PMP.GER.SU 464 PMP.GER.SU 471 PMP.GER.SU 471 PMP.GER.SU 472 PMP.GER.SU 473 PMP.SI.DURL 496 PMP.SI.DURL 72.TURL 73.TURL 73.TURL 74.TURL 74.TURL 74.TURL 74.TURL 74.TURL 75.TURL 75.TURL 75.TURL	457 PHP. GER. SU 468 PHP. GER. SU 67. TOTAL 67. TOTAL 68. PHP. GER. SU 471 PHP. SI 70. TOTAL 512 PHP. SI. DUPAL 512 PHP. SI. DUPAL	GH LOWER 654 .167 GH LOWER 654 .278 GH LOWER 654 .278 .612 MILLION HOURS .839 MILLION HOURS SUB JAN 651B 123.188 416.944 MILLION HOURS RS JAN 832AG 4.564 4.564 MILLION HOURS GF JAN 843AG 4.564 3.839 MILLION HOURS	LOUER 654 .167 JAN 651C .839 JAN 651B 123. B JAN 651B 123. B JAN 651B 123.	.167 .278 .278 .039 .039 .039 .039 .039 .039 .039 .039		38 16 38 16 38 16 FAILURES	199n	8.	
64 PNP.GE 64 PNP.GE 68 PNP.GE 71 PNP.GE 71 PNP.GE 71 PNP.GE 71 PNP.GE 73 PNP.SI	67.101aL 67.101aL 66.101aL F. Su F.	6H LOLER GH LOLER GH LOLER HS JANTX NS JANTX SUB JAN SUB JAN SUB JAN 416.944 H HS JAN 4.564 M	654 654 654 654 651 651 651 651 651 651 651 651 651 651	. 157 . 278 . 278 . 40uRs . 839 . 830 . 83		36 36 36 37 37 38	700		
64 PNP.GE 64 PNP.GE 71 PNP.GE 72 PNP.GE 73 PNP.GE 74 PNP.GE 75 PNP.GE	F. Su 67. TOTAL F. Su F.	6H LOLER 6H LOLER 6H 10H 10H 10H 10H 10H 10H 10H 10H 10H 10	954 954 951 951 951 951 951 951 951 951 951 951	.167 .278 .009 .039 .039 .039 .039 .039 .039 .033.756 .033.756		38 1	799		
64 PNP.GE 64 PNP.GE 71 PNP.GE 71 PNP.GE 72 PNP.GE 73 PNP.SI	67. TOTAL 69. TOTAL 69. TOTAL 70. TOTAL	6th LOLER .612 H .612 H .839 H SUB JAN SUB JAN 416.944 H HS JAN 4.564 M 6F JAN 3.839 H	654 6516 6516 6516 6518 6518 6518 6518 6518	. 278 HOURS		38 I	1.00		************************
64 PNP.GE 88 PNP.GE 71 PNP.GE 89 PNP.SI 88 PNP.SI	67. TOTAL 8. SU 8. SU 8. SU 8. SU 70. TOTAL 1. DUAL	.612 H .839 H SUB JAN SUB JAN 416.944 H HS JAN 4.564 M GF JAN 3.839 H	651C 651B 651B 651B 651B 651B 651B 651B 651B	.039 .039 .039 .039 .038 .038 .038 .038 .038 .038 .038		AILURES	700	***********	OCCUPANTA STATE OF THE PROPERTY OF THE PERSON OF THE PERSO
64 PNP.GE 76 PNP.GE 71 PNP.GE 71 PNP.GE 72 PNP.SI 73 PNP.SI	F. Su 66. TOTAL F. Su F. Su 69. TOTAL 70. TOTAL	NS JANTX NS JAN SUB JAN SUB JAN 416.944 TH NS JAN 4.564 TH GF JAN 3.839 TH	951C 951B 951B 951B 951B 951B 951B 951B 951B	. 039 . 039	9		1	PATE 15	U PHIL/ IDTABILED
64 PNP.GE 68 PNP.GE 71 PNP.GE 98 PNP.SI 88 PNP.SI	66. TOTAL F. SU R. SU R. SU R. SU 70. TOTAL 71. TOTAL	SUB JAN SUB JAN SUB JAN 416.944 II NS JAN 4.564 II 6.944 II 8.944 II 8.944 II 8.944 II 8.944 II 8.944 II 8.944 II	117.10H 117.10H 117.10H 117.10H 117.10H 117.10H 117.10H 117.10H 117.10H	.839 ************************************		****	Chakkakakakaka	*****	*******
71 PWP.GE 71 PWP.GE 89 PWP.SI 38 PWP.SI	66. TOTAL F. SU F. SU 69. TOTAL 70. TOTAL 71. TOTAL	108 JAN 108 JAN 116.944 H 116.944 H 116.944 H 116.944 H 116.944 H 116.944 H 116.944 H 116.944 H	6218 6218 6218 6218 617110N 61710N 6430	HOURS 293,756 123,188 HOURS	Strategic Street	35	1990	.2	3 35 100U .2
88 PHP.GE 21 PNP.GE 98 PHP.SI 22 PMP.SI 38 PMP.SI	F. Su F. Su 69. TOTAL 70. TOTAL 1. DUAL	SUB JAN SUB JAN 416.944 M 4.564 M GF JAN 3.839 M	6518 6518 6518 6518 11L10H 11L10H 6496	293,756 123,188 rxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx		FAILURES		RATE 15	8 FAIL/10**6HRS
98 PHP.51	69. TOTAL 70. TOTAL 71. TOTAL	4.564 M 4.564 M 4.564 M GF JAN 3.839 M	9518 9329 11L 10H 11L 10H	123.188 ###################################	***		********	*****	**************************************
98 PHP.51	69. TDTAL 70. TDTAL DUAL	416.944 H NS JAN 4.564 M GF JAN 3.839 H	9329 111 10H 111 10H 9498	HOURS		32	790	; ?:	
PHP.51	70. TOTAL . DUAL 71. TOTAL	4.564 M GF JAN 3.839 H	9329 ILL 109 9498		18 F	10 FAILURES	recomments	RATE 15	FAILURES RAIL 18 .023984 FAIL/10**6HRS
PNP.SI	70. TOTAL J. DUAL 71. TOTAL	4.564 M GF JAN 3.839 H	11 10H 949A	832AG 4.564	0	46		**************************************	**************************
PNP.SI		GF JAN 3.839 H	849A	HOURS	9 5	FAILURES		RATE IS	
PAP.SI		3.839 H	ILL ION	3.839	-	35	***	35 .5	***************************************
\$				HOURS	-	FAILURES	COCKACH CACACHCACHCACHCACHCACHCACHCACHCACHCA	PRESENTATE IS	2
	N.T.	AT JANTX	TX 649 .149	.149	0	45 16	Desperator and a large of the l	.5	
-	72. TOTAL	. 149 MILLION HOURS	ILL ION	HOURS	8	FAILURES		RATE 15	FAILURES 8 FAIL 18 B FAIL 18 B FAIL 18 B FAIL 18 FAIL
	,LIN	AU JANTX	929	656 .001184		30 .4	.40		
73. T	73. TOTAL	.061184 MILLION HOURS	ILL ION	HOURS	8	FAILURES		FAILURES RATE 15	B FAIL/18**6HPS
132 PNP.51.LIN	1,LIN	GB JANTXV	V 851A	B51A 3743.24	2	18 368FL	368MJ, 15V	.5	
74. 10	74. TOTAL	3743.24 MILLION HOURS	11-10H	HOURS	2 5	FAILURES		FAILURES RATE IS	.534297E-3 FAIL/IBMGHRS
423 PHP. SI.LIN	LIN	- 184 - 184	9220	.184			40N	.255	
ī	I'TIN	\$.50	9229			36	2	525	
	I'TIN	SF JAN	955A		•		300	.255	
416 PMP.SI.LIN	L'IN	GF JAN	855A	24.587	, <u>e</u>	35 5	SU. 458V	.255	
*************	75, TOTAL	27.126 MILLION HOURS	ILL ION H	*	16 F	FAILURES	epokatika sa	PRITE 15	.58984 FAIL/18**6HRS
	N771	GF JAHTX		•		2	71	.3	
MA PAP.SI.LIN		XTARL TO	9510	798.	D 4		2 7	. r	
AND PNP.SI.LIN	NI.	GF JANTX				32	1580	: "	

									- Common	
981	186 PMP.SI.LIN	5	JOHTX	3	.597		5	2	.5	
	76.TOTAL	6.	.981 MILLION HOURS	LL 10N	HOURS		FAILURES	ES	RATE 15	0 FAIL/104mGHRS
98	ES PHP.SI.LIN	44	LOLER	651C 653	- 6	0 N	22	156U	wi ni	DURL.
	77.TOTRL	6	9.1 HI	MILLION HOURS	HOURS	7 .	FAILURES	ES	RATE 1S	.769231 FAIL/10446HRS
98	PMP.SI.LIM PMP.SI.LIM	55	1 1	954 954	.278 .628		B 80	ية. ت	6 .0.	
	78. TOTAL	E.	386 MI	LL 10N	MILL ION HOURS		FAILURES	53	RATE 1S	0 FAIL/10m6HRS
102	781 PNP.SI.LIN	5	GH JAMTX	999	.4165		36	15 6 4.86V		
	79. TOTAL		4165 HILLION HOURS	LL 10N	HOURS		FAILURES	53	RATE 15	0 FAIL/1846HRS
5.5	66 PWF.SI.LIN	55	GH LOLER GH LOLER	999	. 1256		88	200FLJ. 30V 360FLJ. 80V		
1	80. TOTAL	.14	1458 MILLION HOURS	LL 10H	HOURS	9	FAILURES	53	RATE 15	PERSONAL PROPERTY OF PROPERTY OF PAIL / 10 MONTHS
35.5	PPP-51.LIH PPP-31.LIH PPP-51.LIH PPP-51.LIH	& & & & &	# # # # X X X X	9500	. 059 . 083 . 063		***	782 28G	n'n'n'n	
	61.TOTAL	1.	. 127 MILL 10M HOURS	L 10M	HOURS	9	FAILURES	53	RATE 15	8 FAIL/10mSHRS
8	BS PNP.SI.LIN	NS L	LOLER	051 C	. 846		35	15 6 U	.3	
	82.TOTAL	9.	M 9	MILL ION HOURS	HOURS	9	PAILURES	53	RATE 15	PROCESSAR PROCES
1961	PHP.SI.LIN	SAT	MHTX	658 E	. 96954		23	500TL. 80V	.1	
696	PNP.SI.LIN	SAT	XTHE	9596	. 93911		2 2	486FLJ. 48V	- Ē	
929	PHP.SI.LIN	SAT	MHTX	959E	19010		2	25W.86V	.32	
500	PMP.SI.LIN	765	X	958E	93477		K K	SABITA SBV	- · ·	
632	PHP.SI,LIN	SAT	MATX	959E	. 84346		3 23	699MJ, 48V	. 964	
5	PMP.SI.LIN	SAT	HANTX	988E	.113		2	500HJ. 68V	8.	
591	591 PNP.SI.LIN	SAT	PNTX	958E	.017384		22	368MJ. 48V	40 -	
	83.70TAL	.486114	•	MILL ION HOURS	HOURS	9 6	FAILURES	53	RATE 15	STATEST STATES

PHP-51-LIN 5UB JAH 6518 04.738 9 35 594 33 9894 33 PPF-51-LIN 5UB JAH 6518 14.214 9 35 3894 33 PPF-51-LIN 5UB JAH 6518 14.214 9 35 3894 33 PPF-51-LIN 5UB JAH 6518 14.214 9 35 3894 33 PPF-51-LIN 5UB JAH 6518 14.214 9 35 3894 3 3 PPF-51-LIN 5UB JAH 6518 14.214 9 35 3894 3 3 PPF-51-LIN 5UB JAH 6518 14.214 9 35 344 3 PPF-51-LIN 5UB JAH 6518 12.67 PRILUES PRILU	2	ENTRY PART DESCRIPTION	ENV 0	ENV OURLITY SRCE	SPCE	HRS*18+6 FAIL TEMP RATING	FAIL	TEN	PATING	STRESS	COMPENTS
Phys. St. Lin Ste John Gold 142.24 G. 55 1554 G. 55 G. 54	437	PNP.SI.LIN		**	9518	106.685		22	Su 185u	r; r	
PHP-S1.LIM SUB_JAM 6518 144.247 8 35 .754 3 3 3 3 4 4 1 1 1 1 1 1 1 1 1 1 1 1 1	413	PNP. SI.LIN		I	9518	26.859		32	.385W		
PRE-SILLIN SUB-LIN 6518 149-247 0 35 -254 3 PRE-SILLIN SUB-LOURE 6518 26, 659 0 35 .44 3 83. TOTAL 26, 659 HILLION HOURS 0 FAILURES RATE IS RPF-SILLIN-UNIA 5AT JANTA 656 -06522 0 25 2604-66V 66 84. TOTAL 12.87 MILLION HOURS 0 FAILURES RATE IS RPF-SILLIN-UNIA 5AT JANTA 656 -06522 0 25 2604-66V 1 85. TOTAL 56, 66922 MILLION HOURS 0 FAILURES RATE IS RPF-SILLIN-UNIA 5AT JANTA 656 -06522 0 25 2604-66V 1 86. TOTAL 56, 66922 MILLION HOURS 0 FAILURES RATE IS RPF-SILLIN-UNIA 5AT JANTA 659 837 MILLION HOURS 0 FAILURES RATE IS RPF-SILVIN UNIA 649-837 MILLION HOURS 0 FAILURES RATE IS RPF-SILVIN MILLION HOURS 0 60 -06 1540 MILLION HOURS 0 60	430	FNP.SI.LIN		Æ	8218	14.214	•	35	.25u	.3	
## FILLIDH HOURS	431		SUB J		9518	149.247		35	.25U	.3	
PHF-SI-LIN SUB-LOWER 6518 25.839 6 35 .40 .3	1	84. TOTAL	386.86	3 MILI	10H	IOURS	9 F	AILUR	:5	RATE 15	0 FAIL/10**GHRS
## 51. UTA LEG ## 12.07 HILLION HOURS	1000	PNP.SI.LIN	SUB L	OLER	9518	26.859	8	35	.40	.3	
PHP-SI.LIH-DUAL GF JAH B49A 12.87 B 35 S 35	-	85. TOTAL	26.05	9 MILL	8	OURS		AILUR	S	RATE 1S	8 FAIL/18446HRS
## 51.11H DURAL SAT JANTY 6366 - 6522 0 25 256*U.60*V - 662 PHP.51.11H DURAL SAT JANTY 6366 - 6652 0 25 256*U.60*V - 1 ## 51.11H DURAL SAT JANTY 6366 - 6652 0 25 256*U.60*V - 1 ## 51.11H DURAL SAT JANTY 6368 - 66652 0 25 256*U.60*V - 1 ## 51.11H DURAL SAT JANTY 636 - 669632 0 25 40*U.60*V - 1 ## 51.11H DURAL SAT JANTY 649 - 6996 0 35 - 44 ## 51.11H DURAL SAT JANTY 649 - 6996 0 35 - 44 ## 51.5U AN JANTY 649 - 696 0 45 - 16U AN FAT 15 ## 51.5U AN JANTY 649 - 696 0 45 - 16U AN FAT 15 ## 51.5U AN JANTY 656 - 160*136 0 30 - 4U ## 51.5U AN JANTY 656 - 160*136 0 30 - 4U ## 51.5U AN JANTY 656 - 160*136 0 30 - 4U ## 51.5U AN JANTY 656 - 160*136 0 30 - 4U ## 51.5U AN JANTY 656 - 160*136 0 30 - 4U ## 51.5U AN JANTY 656 - 160*136 0 30 - 4U ## 51.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN JANTY 659 - 648 0 40 - 16U ## 61.5U AN J	504	PNP.SI.LIN. DUAL	GF J.	¥.	849A	12.87		35		5.	********************
PHP-S1.LIN. DUML SAT JANTX 656E .06522 6 25 420-0.60V .002 PLR IS 67. TOTAL . 668892 MILLION HOURS 6 FAILURES RATE IS PHP-S1.LINSU SUB JAN 6518 499.837 6 35 .44 2 RAP-S1.LINSU SUB JAN 6518 499.837 6 35 .44 2 RAP-S1.LINSU SUB JAN 6518 499.837 6 35 .44 2 RAP-S1.LINSU SUB JAN 6518 499.837 6 35 .44 2 89. TOTAL . 699.837 MILLION HOURS 6 FAILURES RATE IS PHP-S1.SU AII JANTX 649 .656 6 45 .354 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .067716 6 39 .44 5 PHP-S1.SU AII JANTX 656 .0661529 6 36 .44 364 5 PHP-S1.SU AII JANTX 656 .067716 7 364		86. TOTAL	12.8	MILI	104	OURS		PILUR	5	RATE 15	0 FAIL/10**6HRS
## 51. TOTAL	588	PNP.SI.LIN. DURL PNP.SI.LIN. DURL	SAT J	XXX	958E 858E	. 6522 .668692		22	250rlu. 68V 480rlu. 68V	.002 .1	PUR IS GIVEN PER SIDE
## 51.LINSU SUB JAM 0518 409.837 0 35 .4u .2 ## 51.PUR GF JAM 055A 2.902 0 35 .255 ## 51.SU A1 JAMTX 049 1.492 0 45 .36U .5 ## 51.SU A1 JAMTX 049 1.492 0 45 .36U .5 ## 51.SU A1 JAMTX 056 .000716 0 30 .1.0U ## 51.SU A1 JAMTX 056 .000726 0 45 .36U .5 ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 056 .000726 0 30 .4U ## 51.SU A1 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 51.SU A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .048 0 40 .00 ## 52.CO A2 JAMTX 059 .00 ## 53.CO A2 JAMTX 059 .00 ## 53.CO A2 JAMTX 059 .00 ## 54.CO A2 JAMTX 059 .00 ## 54.CO A2 JAMTX 0	•	67. TOTAL	.06889	2 HILL	10N	IOURS		ATLURE	S	RATE 15	8 FAIL/18**6HRS
## 51.PLR GF JAN HOURS 0 FAILURES RATE IS ## 51.SU A1 JANTX 049 1.98 0 45 48U .5 PHP.51.SU A1 JANTX 049 1.492 0 45 1.8U .5 PHP.51.SU A1 JANTX 049 1.492 0 45 1.8U .5 PHP.51.SU A1 JANTX 056 000140 0 30 1.0U PHP.51.SU A1 JANTX 056 000140 0 30 1.0U PHP.51.SU A1 JANTX 056 000140 0 30 3.U PHP.51.SU A1 JANTX 056 001052 0 30 3.U PHP.51.SU A1 JANTX 059 048 0 40 10U	=	PNP.SI.LINSU	r ans		9518	489.837		35		.2	
AL 2.962 MILLION HOURS 6 FAILURES RATE IS AL 2.962 MILLION HOURS 6 FAILURES RATE IS AL 2.486 MILLION HOURS 9 FAILURES RATE IS AU JANTX 856 .086726 9 38 2U AU JANTX 856 .086139 8 38 3U AU JANTX 857 .0861 8 8 8 8 3U AU JANTX 857 .0861 8 8 8 8 4U AU JANTX 857 .0861 8 8 8 8 4U AU JANTX 857 .0861 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		88. TOTAL	409.83	7 MILL	TON	OURS	9 5	ATLUR	S	RATE 15	8 FAIL/18***GHRS
##F.51.5U	-	PNP.SI.PLR	150		855A	2.982		35		.255	
PHP-SI.SU RI JANTX 049 .298 0 45 .364 .5 PMP-SI.SU RI JANTX 049 1.492 0 45 .364 .5 PMP-SI.SU RI JANTX 049 1.492 0 45 1.04 RI JANTX 049 1.492 0 45 1.04 PMP-SI.SU RU JANTX 056 .000716 0 30 1.04 PMP-SI.SU RU JANTX 056 .000720 0 30 34 PMP-SI.SU RU JANTX 056 .000720 0 30 .44 PMP-SI.SU RU JANTX 059 .00070 0 30 .44		89. TOTAL	2.98	2 MILL	ION	OURS	9	ATLUR	.5	RATE 15	8 FAIL/18##SHRS
90. TOTAL 2.486 HILLION HOURS 6 FAILURES RATE IS PHF.51.94 AU JANTA 636 .007716 0 30 1.0U 30 1.0U PHF.51.94 AU JANTA 636 .006140 0 30 3U PHF.51.94 AU JANTA 636 .006132 0 30 3U PHF.51.5U AU JANTA 695 .00135 0 30 .4U PHF.51.5U AU JANTA 695 .00136 0 30 .4U PHF.51.5U AU JANTA 699 .042 0 40 10U PHF.51.5U AU JANTA 699 .048 0 40 10U		PHF.51.9U PHF.51.5U PHF.51.5U		¥¥¥	222	.298 .696 1.492		666		ທ່ ໜ່ ໜ້	
PHP.51.9U PHP.51.5U PHP.51.9U PHP.51		90. TOTAL	2.48	9 MILL	ION	OURS	9	ATLURE	5	RATE 1S	
PHP.51.5U PHP.51		PHP.51.9U	55	XX	926	.000148		22	1.9U 2U		
PHP.51.5U PHP.51		PNP.51.9U	5:	MTX	926	. 868592	•	2	2		
PHP.51.5U		Pre-SI-Su	2 2	XX	926	. 661636		B 8	3 3		
PHF.51.5U AU JANTX 859 .848 6 40 10U PHF.51.5U AU JANTX 859 .848 6 40 10U PHF.51.5U AU JANTX 8514 2973.18 2 10 1.8U.40V .5 92.7ITA 2973.1 HILLION HOURS 2 541.00C		PHP.51.5W	- S	WIX	620	.432			.364		
91.707aL . 539021 MILLION HOURS 0 FAILURES RATE IS PHP.51.5U GB JANTXV 051A 2973.10 2 10 1.0U.40V . 5			28	XTM	629	. 948		**	32		
PAP.SI.SU GB JANTXV 851A 2973.18 2 18 1.8U.48V .5			53902		NOI	OURS	9	ATLURE	5	RATE 1S	AND THE PROPERTY OF THE STATE O
National Control of the Control of Control o	-	PHP.SI.SU	r e5	PNTXV	9519	2973.10	2	9	1.8U.48V	.5	
L'ALLE MAN MONTO L'ANTENES		92.TOTAL	2973.	I HILL	ION.	OURS	2 F	AILURE		RATE 15	. 672699E-3 FAIL/IBR#GHRS

74.SI.SI	GF JGH 0448 1379 2	275 25 10	m, m,	
2.15	119.105		8-8	
31.30	GF JAN 8499 32.636 1	2 1		
2.5	G 100 C 100 000 000 000 000 000 000 000 0	2 K	i wi	
3.1	GF JRN 0450 3.017		9.	
3.10	GF JAN 845A 487.112 3	3 E	s.	
3:1	GF JAN 049A 138,562 0		n,	
2:5	GF JAH 0490 415.451 0	2		
3:	GF JAN 855A 3.222 8	3	56.	
33:1	GF JAN 845A 15.338 6 GF JAN 855A 1587.646 1	31 SE	. k.	
93. TOTAL	5254.4 MILLION HOURS 317	FAILURES	RATE 1S .	683384E-1 FAIL/18m6HRS
11.80	GF JANTX 851C .846 8	25 10	.2	
31.30	GF JANTX 851C .895 8	25. 1.82	.2	
31.8	64 JAHTX 851C . 846 8	2 2	.2	
31.35	OF JANTY 651C .313 6	2 2 2	77	
91.54		2 2	•	
PHP.S1.94	951C	3:	?:	
PIE. 51. SU	2	2	?!	
FF.SI.92	GF JANTX 845 2.784 0			
S. T. S.	-	***	************	
94. TOTAL	11.694 MILLION HOURS 6	FAILURES	RATE 1S	0 FAIL/IBMGHES
PMP.S1.SU	GF JANTXV 868 .285112 8	76 R	(.3	
95. TOTAL	.285112 MILLION HOURS 0	FAILURES	RATE 15	8 FAIL/1844GHRS
91.34	GH JAH 854 .618	36 .364	8.	
S. 18	JR1 954	72 98	•	
Pre. 51.34	GH JAN 854 .835 8	3. R	•	
SI.94	-	2 8	•	
PHP.51.5W	JRH 854	36 .364	е.	
PM. S1.9W	GH JIM 854 .479 0	2 2 2	e. ·	
S1.5U	J. P.	38 10	8.	***************************************
96. TOTAL	5.825 MILLION HOURS 0	FAILURES	RATE IS	8 FAIL/18**SHRS
W.18.9W	JANTX 866			
PNP.SI.SU	GH JANTX 866 1.2496 GH JANTX 866 .8416 8	38 1.84.46V		
67 ThTo	GION NOT THE TOTAL	Fallibes	DOTE IS	70C165 E011 / IMPACHDS

424	PNP.SI.SU	5	LOLER	854	.828		38	3	8.	
292	PMP.S1.9U	55	LOLER	998	.8288	• •	8 8	31874.46V 64.68V		
	96. TOTAL		.1217 MILLION HOURS	LL 10H 1	OURS	9	FAILURES	:5	RATE IS	B FAIL/18**SHRS
	PNP.SI.SU	RS	JANTX	9510	.820		35	2	.2	
	PHP.SI.SU	£	JANTX	9516	.252	•	35	1.80	.2	
\$	PNP.SI.SU	£	JAHTX	9510	.013	•	23	2	.2	
£44	PMP.51.5W	¥	JAHTX	9510	.82		35	26	.2	
	PNP.51.5U	£	JANTX	9510	.124		33	25	.2	
14	PNP.SI.SU	¥	JANTX	951C	.039		35	1.81	.2	
	99. TOTAL		468 MILLION HOURS	L10N	OURS	8	FAILURES		RATE 15	9 FAIL/18**SHRS
1	PNP.SI.SU	SAT	SAT JANTX	858E	.008692		25	34.687	.1	********
636	PHP.SI.SU	SAT	SANTX	BEBE	. 87823		23	40011.68V	.83	
	PNP.SI.SU	SAT	JAHTX	858E	.84346	•	52	368MJ. 68V	180.	
	PNP.51.5W	SAT	JAHTX	958E	.15912	•	52	368HJ, 48V	901.	
	PHP.SI.SU	SAT	JANTX	959E	69869	•	52	688HJ, 35V	.3	
	PHP.SI.SU	SAT	JAHTX	959E	.01738	•	23	48611, 68V	26.	
	PNP.51.5W	SAT	JANTX	858E	. 66435	•	52	368ru, 68V		
	PHP.SI.SU	SAT	XTHAL	BEBE	. 12683	•	23	1.8U.68V	.917	
	PMP.51.5U	SAT	MATA	958E	96660.		23	1.84.687	660.	
	PNP. 91. 54	SAT	X MATX	9286	. 63642		2	1.84.68	.13	
	Pre-51.50	SAT	X	200	59896		C	34, 687	.183	
	JS: 18.	SAT	X	200	69899		C	3607L.68V		
	DE 15.30	i g	TONI		PKS 19		Q X	1 941.690	. 5	
	20.00	FAZ	¥	200	69000		3 2	1. BL. CAV		
	Pre-51.5u	SAT	SPINT	858E	.04346		22	300ru, 15v	769.	
	PNP.SI.SU	SAT	SANTX	958E	.27814	•	23	1.8U.68v	269.	
	PNP.SI.SU	SAT	JAHTX	9950	.02688	•	22	1.84.684	.862	
	PHP.SI.SW	SAT	JANTX	858E	.01738	•	22	300m, 15V	.03	
	PNP.51.5W	SAT	SANTX	858A	91.62	•	22	1.8W.48V		
	PMP.51.5W	SAT	THE	958A	4.14	•	2	688MJ. 35V		
	PHP.51.5W	SAT	SANTX	959E	. 83842		2	400177 18V		
	PHP.SI.SU	SAT	THE	958E	.33899	•	2	368HJ. 48V	186.	
	PHP.51.5U	SAT		958E	19010.	•	2	1.84,467	60.	
545	PHP.SI.SW	SAT		958E	. 1643		52	20017.48V	.15	
TO S	PNP.SI.SU	SAT	JANTX	858E	.25287		52	486HJ, 68V	-	
	100. TOTAL	187.	187.541 MILL 10N HOURS	T 10H H	OURS	9	FAILURES	53	RATE 1S	0 FAIL/18wwGHRS
1	PMP. SI. SU	9ng	SUB JAH	9518	168.199		35	.36W	.2	
	1000	9170		-					!	
			-	82.68	14.214	•	35	3		

102. TO 103. T	, de la k	3333	***	28		N-4	22	3.1	2.	
		222	ĘĘ	2	132.664	- •	2			
		3	¥	33	822.843	=	22	36.3	,,,,	
	OTR.		454.57 HI	MILLION HOURS		18	FAILURES	S	RATE IS	.123748E-1 FAIL/18m6HRS
	OTHEL.	SUB	SUB LOLER	9518	35.535		35	.30	.3	
	2	35.	35.535 MI	MILLION HOURS	HOURS		FAILURES	S	RATE 1S	8 FAIL/18m6HRS
titi		3	JAN	9490	9.265		35		.5	
	OTAL.	9.7	9.205 HI	MILLION HOURS	HOURS		FAILURES	5	RATE 1S	0 FAIL/10**6HRS
		ī	JAHTX	8	. 6636		35	V66V	.64∨	
-		=	SMITH		. 6636		55	.954.68v	9.684	
		=	THE	ı	. 9638		33	.887.68v	.62,.37	
		=	XTM	2	. 9638		25	10.40	.4.32v	
		=	THE	2	. 9636	•	8	200	. 95v	
		=	XTA	ı	. 9636	•	8	7.34.386V	V 810.	
		=	X X	2	. 9636		8	2.47.68v	.012017	
		= :	XT X	2	.0030	•	8	> 8 3 7	0.0.27	
		= =			959		8	K. 304. 00V	0.0012v	
200			1	3	25.50		8 5	941.68		
147 Pre-S1.U			X	3	25.80			Su. 68v	. BB 21V	
		=	XTAR		. 0636		200	V89	.37	
		=	JAMTX	3	. 6636		8	.9574.68V	9.6 89V	
8		=	XTHE	2	. 6638		20	2.44.68V	9.66124	
		=	THE	2	. 9638		8	199	.25v	
192 PHP.SI.U		=	XTAN	2	. 9636		8	200	.377	
7 PMP.51.U		=	SPATX	3	. 6636		32	.96W.68V	.1310V	
196 PHP.SI.U		E	SANTA	2	. 6636		52	200, 60V	9.9.167	
-		=	THE	3	. 9636		32	.94U.68V	9.691	
		=	JAMTX	2	. 9638		8	364.66V	9.9.14	
		=	THE	2	. 0038	•	8	200	. esv	
To No.		=	SPHTX	2	. 6636	•	20	7.74.386V		
169 PHP.SI.U		=	THE	2	. 9636	•	25	284.58V	.0164	
1		=	JANTX	5	. 9638	•	8	.94M. 68V	9.614	
6 PMP.51.U		ē	JANTX	2	. 9638		25	7.7'J. 48V	.85,.32v	
104. 10	OTPIL,	. 89	IH 8868	MILLION HOURS	HOURS		FAILURES	S:	RATE 1S	8 FAIL/18446HRS
459 PHP-SI.U 463 PMP-SI.U		55	XTMAL	959 959	1.164		88	3 9 .		
105. TO	erretter	2	2 79 MI	HILLION HOUSE	######################################	4	E O II LIDES	ckerrekenppp G	POTE 16	ESPECIAL SECTION OF THE SECTION OF T

248	PNP.51.U	GB JA	JAHTXV	9519	125.372				.5	
	106. TOTAL	125.372		MILLION HOURS	DURS		FAILURES	53	RATE 15	8 FAIL/18**GHRS
61.2	PMP, S1, U PMP, S1, U		OLER-	963	5.1	- m	22	33.	2: -:	
922	PNP.51.U	5 5	LOLER	590	19.69	8.	30		7.5	2 2
504	PNP.SI.U		LOUER	653	926	674	8			STRLL SIG
234	PNP.SI.U	55	LOUER	953	118	231	22		i, iv.	DARL ING TON
	167. TOTAL	1140.42		MILL ION HOURS		978 F	FAILURES	ES	RATE 1S	.857579 FAIL/10**6HRS
282	PHP.SI.U PHP.SI.U	9 P	PLASTIC 053 PLASTIC 053	953		997	25		ri vi	PUR STALL SIG
	106. TOTAL	1936		MILL ION HOURS		1183 F	FAILURES	ES	RATE 15	.569731 FAIL / 10**6HRS
9	Pre-SI.U	SAT JA	JANTX	958E	.65215		R	225FL. 40V	.1	
*	PHP. 51. U	SAT JA	MHTX	9296	. 1843	•	2	225FL. 40V	•	
612	Pre-SI-U	SAT JA	ATA	9366	. 82666	•	2	225HJ. 40V	-:	
279	B.S. 1	A TAS	X	9305	. 00934 BESS4		2 %	225PLL 68V	(日本ののできるのである。 (日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日本の日	
299	Pre-SI.U	SAT JA	XTM	929	.63477		2	225MJ. 60V		
623	PHP. 51.U		MATA	BSBE	.85215		2	2001LJ. 40V	2.	
286	PHP. SI.U		THE	929E	- 734	•	2	200TL. 40V	-	
619	5.15.4	A TAS	X	PSAF	85214		2 2	225FLL. 40V		
699	PHY.SI.U		JAMTX	BSBE	. 82688		2	225HJ. 48V	Section of Party	
1119	PHP. 51.U		JAHTX	959E	.02608		2	20011. 40V	.133	
263	PHP.SI.U		MATX	959E	. 86954		2	225MJ. 68V	-	
502	PHP.SI.U		ATA	852	386.838		E H		۲.	
999	PNP.SI.U	SAT JA	XIMIX	2000	61260.		C K	Seeral dev	2.5	
294	PNP.SI.U		MATX	BSBE	.05215		3 2	225PLJ. 48V	3	
100	PMP.SI.U		JANTX	958E	1391		22	225MJ. 68V	•	
*CONTRACT	109. TOTAL	388.89	388.89 MILLION HOURS	ION H	OURS	9 6	FAILURES	53	RATE 15	8 FAIL/18**6HRS
202	0.18.4NP 0.18.4NP	HAL BUS	II	914	1368.84 6	13	8 &	2.		
		1374.84 MILLION HOURS	MILL	ION H	374.84 MILLION HOURS	13 F	FAILURES	13 FAILURES	RATE 15	.945565E-2 FAIL/10**6HRS
742		P. 16	AI JANTX 849 .149	649	-149	0	4	.45W	.5	
capaci			******	CHARLE WAY	大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大大			CHORLEGIS AND	THE PROPERTY OF STREET, STREET	destruction and the second

493 UJT GF JAN 6558 4.624 6 36 .45U .255 492 UJT GF JAN 6558 1.451 6 35 .45U .255 23-8 UJT GF JAN 6558 1.451 6 35 .45U .255 23-8 UJT GF JANT 649 .597 6 45 .45U .5 113.TOTAL .6312 MILLION HOURS 6 FAILURES RATE 114.TOTAL .6312 MILLION HOURS 6 FAILURES RATE 115.TOTAL .6312 MILLION HOURS 6 FAILURES .23007U .1	ENTR	Y PART	ENTRY PART DESCRIPTION	£	V OURL	ITY SR	# W	ENV QUALITY SRCE HRS+10+6 FAIL TEMP RATING	FAIL	TEP	RATING	STRESS		CONFENTS
113. TOTAL 19.287 MILLION HOURS 4 FAILURES UJT GF JANTX 649 .597 8 45 .459 .55 113. TOTAL .597 MILLION HOURS 8 FAILURES UJT GH LOWER 666 .0164 8 39 UJT GH LOWER 666 .0164 8 39 UJT RATIONAL .6932 MILLION HOURS 8 FAILURES: UJT RS JAN 8 JAN 6026 .651 8 40 113. TOTAL .651 MILLION HOURS 8 FAILURES UJT SAT JANTX 856 .851 8 40 UJT SAT JANTX 856 .856 8 25 38674 .1	25			3 5 5		888	855	.451			\$ 6	2555		UNIJUNCTION
UJT	2	3		19	782	HILL 10	N HOU	S. O.C.	4	AILURE	53	RATE 15	S	. 287394 FAIL/IBW6HRS
113.TOTAL .597 MILLION HOURS 0 FAILURES	38	TCD		5	JANT	ě		597		ę	.45U	.5		
UJT GH LOWER 066 .0104 0 30 UJT GH LOWER 066 .0208 0 30 114.TOTAL .0312 MILLION HOURS 0 FAILURES: UJT NS JAN 032AG .051 0 40 115.TOTAL .051 MILLION HOURS 0 FAILURES UJT SAT JANTX 052 1.64 0 25 UJT SAT JANTX 058 .005 0 25 UJT SAT JANTX 058 .005 0 25 300FU .1					.597	HILL 10	HOC H	RS	9 F	HILUR	5	RATE 1S	S	8 FAIL/18**SHRS
114.TOTAL	=8	35		55	100			9620		22				
115.707AL .051 MILLION HOURS 0 FAILURES UJT SAT JANTX 052 1.64 0 25 UJT SAT JANTX 058 .005 0 25 UJT SAT JANTX 058 .00 0 25 UJT SAT JANTX 058 .00 0 25					9312	M164 10	N HOU	RS	9	AILUR	. 5	PATE 15	SI	0 FAIL/10**GHRS
113.TOTAL051 MILLION HOURS 0 FAILURES UJT SAT JANTX 052 1.64 0 25 UJT SAT JANTX 050E .005 0 25 300TL .1 UJT SAT JANTX 050E .00 0 25 300TL .1	92	T.U		¥	JAN		296	159		8				
UJT SAT JANTX 652 1.64 0 25 UJT SAT JANTX 656E .065 0 25 UJT SAT JANTX 656E .00 0 25			15.70		. 051	HILL 10	N HOL	RS	9	PILUR	5	RATE 1S	Ś	8 FAIL/18**GHRS
	31	555		& & &	T JAHT T			2. 8 8			386TL	z: -: -:		
116.TOTAL 1.725 MILLION HOURS 8 FAILURES RATE				1	.725	MILL 10	N HOL	RS	9	AILUR	53	RATE IS	S	8 FAIL/18**GHRS

APPENDIX C INTERMEDIATE DATA SUMMARY - DIODES

7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ENTE	ENTRY PART DESCRIPTION	EHY OUAL	ENV QUALITY SRCE	HRS+18+6	FATL	HRS+18+6 FATL TEMP RATING	STRESS	COPPENTS
GF JANTX 649 .746 0 .746 HILLION HOURS 0 NS JAN 83266 1.269 0 1.26 HILLION HOURS 0 GF JANTX 6556 .65 0 GF JANTX 6556 .65 0 SUB JAN 6518 1165.548 4 1227.14 MILLION HOURS 1298 GF JANTX 6556 .6 0 SUB JAN 6518 1165.548 4 1227.14 MILLION HOURS 1298 GF JANTX 6556 1.134 0 GF JANTX 6559 1.134 0 GF JANTX 6559 1.134 0 GF JANTX 6559 8.4917 0 GF JANTX 6559 8.391	476	FAST RECOV FAST RECOV FAST RECOV		8498 8498 6498	17.278 5.759 82.721		35 35	ຄ ໍຄໍຄໍ	
GF JIMITA 649 7746 6 7.246 HILLTON HOURS 6 NS JAN 63246 1.268 6 1.26 JANTA 6558 2.992 6 GF JANTA 6558 3.99 6 3.535 HILLTON HOURS 6 3.535 HILLTON HOURS 6 SUB JAN 6518 1165.548 4 1227.14 MILLTON HOURS 129 GF JANTA 6558 1.134 6 GF JANTA 6558 1.134 6 GF JANTA 6558 1.139 6 GF JANTA 6558 1.139 6 GF JANTA 6558 1.139 6 GF JANTA 6558 1.129 GF JANTA 6558 1.129 GF JANTA 6558 1.129 GF JANTA 6558 938 9 7.61 MILLTON HOURS 1 GF JANTA 6558 1.29 6		1. TOTAL	185.758	MILL ION		5 F	AILURES	PATE 15	.472777E-1 FAIL/10mm6HRS
1.26 MILLION HOURS 0 1.26 MILLION HOURS 0 1.26 MILLION HOURS 0 2.35 MILLION HOURS 0 3.535 MILLION HOURS 0 3.535 MILLION HOURS 1298 4.917 MILLION HOURS 1298 5.98 JAN 75 65 1134 0 6.5 JANTX 6556 1.134 0 7.5 MILLION HOURS 1.593 0 1.593 MILLION HOURS 0 4.917 MILLION HOURS 0 4.917 MILLION HOURS 85 5.5 MILLION HOURS 85 6.5 MILLION HOURS 85 7.5 MILLION HOURS 85 8.5 MILLION HOURS 85 9.5 MILLION HOURS 95 9.5 MILLION HOURS 95 9.5 MILLION HOURS 95	48	FAST RECOV	GF JANT	× 649		6	45	.5	GF 88x, AI 28x
STOTAL 1.26 MILL ION HOURS 0		2. TUTAL	.746	MILL TON P		9 6	AILURES	RATE 15	8 FAIL/18 WIGHRS
3. TOTAL 1.26 MILLION HOURS 0	458	GER. GP		832AC		0	40		
GEP.GP.51G SUB JAN 651B 1165.548 4 5. TOTAL 1227.14 MILL ION HOURS 1298 PIN GF JANTX 655A 1.134 0 FIN GF JANTX 655A 1.139 0 FIN GF JANTX 655A 1.99 0 FIN GF JANTX 655A		3. тотя.		HILL ION !	IOURS	8 5	AILURES	PATE 15	8 FAIL/IB##GHRS
GER.GF.SIG SUB JAN 6518 1165.548 4 GER.GF.SIG SUB JAN 6518 1165.548 4 5. TOTAL 1227.14 MILL ION HOURS 1298 FIN GF JANTX 6558 1.134 0 FIN GF JANTX 6558 1.136 0 FORTINY GF JANTX 6558 1.139 0 G. TOTAL 1.593 MILL ION HOURS 1 SCHOTTRY GF JANTX 6558 4.917 0 SCHOTTRY GF JANTX 6558 8.918 0 SCHOTTRY GF JANTX 6558 8.918 0 SCHOTTRY GF JANTX 6558 8.918 0 SCHOTTRY GF JANTX 6558 8.917 0 SCHOTTRY GF JANTX 6558 8.917 0 SCHOTTRY 65 JANTX 6588 8.918 0 SCHOTTRY 65 JANTX 6	395		GF JANT GF JANT GF JANT	X 855A X 855A X 855A	2.902 .033	000	35 35 35		
STOTAL 1227.14 MILLION HOURS SCHOTTYY CF JAN 0518 1165.54			3.535	HILL ION P	OURS		AILURES	RATE 15	0 FAIL/10***SHRS
FIN GF 10794 1227.14 MILLION HOURS PIN GF 1847 8558 1.134 PIN GF 1847 8558 1.134 PIN GF 1847 8558 1.28 PIN GF 1847 8558 1.28 PIN GF 1847 8558 1.28 PIN GF 1847 8558 1.29 PIN GF 1847 8558 1.29 PIN GF 1847 8558 1.29 SCHOTTY GF 1847 8558 4.917 SCHOTTY GF 1046 853 351 SCHOTTY GF 1046 853 351	391		SUB JAN SUB JAN	0518 0518	61.594 1165.548	64			
FIN GF JAN 0440 8291.84 6. TOTAL 8291.84 HILLION HOURS 11 FIN GF JANTX 055A 1.134 7. TOTAL GF JANTX 055A 1.189 SCHOTTRY GF JAN 0440 HOURS SCHOTTRY GF JAN 0440 HOURS SCHOTTRY GF JAN 0440 1533 351 4.917 PILLION HOURS		5.	1227.14	MILL TON P	IOURS	4 F		15	.325961E-2 FAIL/10**6HPS
FIN GF JANTX 055A 1.134 FIN GF JANTX 055A 1.134 FIN GF JANTX 055A 1.134 FIN GF JANTX 055A 1.20 FIN GF JANTX 055A 1.20 FIN 0.40 1.50 SCHOTTRY GF JANTX 055A 4.917 SCHOTTRY GF LOWER 055 4.917 SCHOTTRY GF LOWER 053 351 10. TOTAL 351 PILLION HOURS	482		GF JAN	844A	8291.84	1298	25	.3PuR	
PIN GF JANTX 055A 1.134 PIN GF JANTX 055A 5.418 PIN GF JANTX 055A 5.418 PIN GF JANTX 055A 1.20 PIN 7.107AL 7.61 MILLION HOUPS SCHOTTRY GF JANTX 055A 4.917 SCHOTTRY GF JANTX 055A 4.917 SCHOTTRY GF LOVER 053 351 MILLION HOURS SCHOTTRY GF LOVER 053 351 MILLION HOURS SCHOTTRY GF LOVER 053 351 MILLION HOURS MILLION HOURS SCHOTTRY GF LOVER 053 351		6. TO	8291.84	HILL ION H	IOURS 12	38 F	AILURES	PATE 15	. 156539 FAIL / 10 *** GHRS
SCHOTTRY G. TOTAL G. TOTAL G. TOTAL G. JAHY 0.440 1.503 SCHOTTRY G. JAHY 0.534 4.917 G. JAHY 0.554 4.917 SCHOTTRY G. TOTAL G. TOTAL 351 PILLION HOURS 351	8658		GF JAHT	X 855A X 855A X 855A X 855A	1.134 5.418 .128 .938	0-00			
SCHOTTRY 6. TOTAL 1.583 MILLION HOURS SCHOTTRY 9. TOTAL 4.917 MILLION HOURS SCHOTTRY GF LOWER 10. TOTAL 351 MILLION HOURS		7. TOTAL		MILL FON P		-	ATLUPES		. 131486 FRIL/18**6HRS
SCHOTTRY SCHOTTRY SCHOTTRY SCHOTTRY GF LOLEP 653 351 10. TOTAL 351 PILL ION HOUPS	408	SCHOTTRY		9.140			25	. 4	
SCHOTTKY GF JANIX 0556 4.917 9. TOTAL 4.917 MILLION HOURS SCHOTTRY GF LOWER 053 351 10. TOTAL 351 MILLION HOURS			:	HILL TON P		9	AILURES	PATE 15	0 FAIL/10**6HRS
9. 107AL 4.917 FILLION HOURS SCHOTTRY SCHOTTRY 10. T07AL 351 MILLION HOURS	135	SCHOTTKY		× 0559	3	0	35 22A	.2	
SCHOTINY SCHOTINY 10. TOTAL 33				MILL ION P	8	9 5	AILURES	RATE 1S	B FAIL/IN**6HRS
JTRIL.	49.		GF LOUE	P 053		92	55	.3	
		JTRIL.	351	MILL ION P	OUFS	35 F	ATLUPES	RATE 15	.242165 FAIL/10**6HRS

ENV QUALITY SPCE
JANTX
.4351 MILLION HOURS
GF JAHTX 849
* -
SAT JANTX 058D 1.90
1.9 MILLION HOURS
A JANTX 845
AI JAHTX 845
AT JANTY 845
AI JANTX 845
AT JANTX 045
AI JANTX 845
SPE XTMBL 19
AI JANTX 845
-
AI JANTX 845
AL JANTX 845
AI JANTX 845

-	SI.GP.RECT	=	MATA	2	.007532		88	288	.6.2	
5	SI.GP.RECT	=	THE	2	.007532		55	1.694	61.	
-	SI.GP.RECT	=	XTHE	3	.003766		52	289		
8	SI.GP.RECT	=	THE		.863766	•	55	1.58A	.633	
S	SI.GP. RECT	£	JANTX	645	.011298		52	124	.582	
	SI.GP.RECT	=	SANTA	645	. 887532		55	124	.36	
87	SI.GP.RECT	=	JANTX	845	. 883756		53	1.586	.079	
S	SI.GP.RECT		JANTY	945	.011298		55	1.584	.842	
G	SI.GP.RECT	B	JANTX	945	.003766		55	1.92A		
U)	SI.GP.RECT	æ	JANTX	845	.011298		25	1.58А	=:	
	14. TOTAL	. 293	293848 MILLION HOURS	LL 10N P	HOURS		FAILURES	ES	RATE 15	0 FAIL/18mGHRS
	Co occ .	110	TONE OF	200	000000		*****	20		
1.00	SI.GP.RECT	28	STNE	950	.000237					
48	15. TOTAL	99.	.00073 MILLION HOURS	TETON P	.00073 MILLION HOURS 6	-	FAILURES	FAILURES	RATE 1S	RATE IS 0 FAIL/10#GHRS
1000	***************************************	******	******	*****	***************************************	***		****	*************	
		1	100	1	10 21		1	2400	.	
		90		01.30	5031 353			2.50		
	SI.GP.RECT	89	JAHTXV	8258	12.873		37	228		
	16. TOTAL	7068.71	100	MILLION HOURS	OURS	9 6	FAILURES	######################################	PATE IS	PETER STANDARD SECTION SECURITY SECURIT
200	SI.GP.RECT	19	IRN	8440	114.59	=	25	**********	entraction statement and statement	********
	SI.GP.RECT	3	Her	8440	.841		25.			BRIDGE
	SI.GP.RECT	15	HAL	844A	.027		2			BRIDGE
	SI, GP. PECT	95	J.H.N	8258	.138		36	.88A		
	SI.GP.RECT	5	JAH	9229	43.986	-	38	E		
	SI, GP. RECT	9	JAN	9250	. 184		36	A78.		
	SI, GP, RECT	45	JAN.	8258	31.31	-	36	129		
	SI, GP. RECT	15	JAH.	9229	.322		30	35A		
	SI, GP, RECT	5	JAN	8258	.046		30	.35A		
	SI, GP, RECT	35	JAN	855B	1.234		38	.254		
	SI.GP.RECT	*	JAN	822B	1.637	•	38	1.25A		
		3	MA	849H	12.87	2	32		S.	8
	17. TOTAL	205.	205.505 HI	MILL ION HOURS	OURS	15 F	FAILURES	ES	RATE 15	.729909E-1 FAIL/10xx6HRS
	SI.GP.PECT	95	JANTX	855A	49.587	2	35	.25A		
	SI.SP.RECT	25	JAHTX	855A	196.	6	35			
	91. GP. PECT		INNTX	8558	.24		2	180		
	SI.GP.PECT		JAHTX	8550	2.902	, -	2	-		
100	ST.GP. PECT		INTX	9550	2.382		,	25		
31.0	SI.GP.PECT	5 2	- STATE	9550	4 37	, ,	2 :			
3)										

ENTRY PART DESCRIPT		En.	ENV WOMENTY SALE	3475				יאין ובוב אוון ובוב אווויים	2000	
SI.GP.RECT		5	XTHE	955A	- 00	• •	20 2	130		9R I DGE
SI.GP. RECT		3 3	NATA Y	6556	8.646	, N	2 22	356		
SI.GP.RECT		5	THE	955A	11.578		32	=		
SI.GP.RECT		5	JAHTX	9559	2563.950		32	1.25A		
SI.GP.RECT		5	JAHTX	649	.994	•	ę	129	•	GF 88x. A1 28x
SI.GP.RECT		4	JANTX	849	.497		\$	384	5.	GF 88x. AI 28x
18. TOTR	1 ₂	2673	1673.87 MILLION HOURS	L10N H	OURS	SF	FAILURES	53	RATE 15	.186995E-2 FAIL/18***6HRS
SI.GP.RECT		5	LOKER	963	18.38	163	36		.2	PUR
SI.GP.RECT		*	LOLER	963	50.36		36		-	2
SI.GP.RECT		*	LOLER	663	66.48	8	8		-	
SI.GP. RECT		*	LOLER	963	18.38	13	36		•	2
SI.GP.RECT		5	LOLER	953	S.	13	25		n;	
SI.GP.RECT		*	LOLER	953	4	121	25	100		BRIDGE
SI.GP.RECT		5	LOLER	953	1531	247	8	£	s;	
SI.GP.RECT		5	LOVER	3	12		K		r.	
SI.GP.RECT		*	LOVER	3	901	103	5	&	n,	
SI.GP.RECT		3	LOLER	653	-	12	2	- MA	e.	
SI.GP.RECT		4	LOLER	653	m	~	5	48		PRIDGE
SI.GP.RECT		4	LOVER	953	2	2	2	8	S :	
19. TOT P	TRL	195	1956.6 MILLION		HOURS 7	98	PAILUR	ES	RATE 1S	.357763 FAIL/IOMMEHRS
SI.GP.RECT		5	1957	25	.626		2	386	9.	
SI.GP.RECT		5	HE	954	. 139	•	2	£	•	
SI.GP.RECT		5	185	400	.139	•	200	124	•	
SI.GP. RECT		5	JAN	927	. 962	•	2	S	0.	
SI.GP.RECT		5	1	2	1	•	*	124	•	
SI, GP, RECT		5	THE,	426	110.	•	2	S	•	
SI.GP.RECT		5	F	45	.516	•	200	5	•	
SI.GP. RECT		5	THE	456	269.		2		•	
SI, GP. RECT		5	1	456	.245	•	36	3	•	
SI.GP.RECT		5	TE,	2	. 042	•	2		•	
		5	Ter.	27	. 828		2	350	8.	
20. 1014	TAL	-	1.752 MIL	MILL ION HOURS	OURS	9	AILURES	53	RATE IS	8 FAIL/10**GHRS
SI.GP.RECT		15	XTMAL	990	.0416		36	36		
SI, GP. RECT		5	SPHTX	998	9666.		30	350		
SI, GP, RECT	State September 1999	5	SANTX	990	.9163		36	=		
SI.GP.RECT		5	JAHTX	990	9162.		36	30		
21. TOT	TAL	2.2	2.2491 MILLION HOURS	L 10N H	OURS	9	FAILURES	53	RATE 15	0 FAIL/10***CHRS
SI.GP.RECT		5	GH LOLER	954	.821		30	289	8.	
22. TOT	To		821 HIL	MILL TON HORRS	DIRES	9 6	FAIL LEES	53	RATE 1S	6 FAIL/18tofNRS
10							-			•

-			-	-		:		THE RESIDENCE OF THE PERSON		
	SI.W. RELI	LA MIL	*******	- 567		38	Children and and and and and and and and and an	8.	-	
1	23. TOTAL	.ee7 HII	MILLION HOURS	OURS		FAILURES	52	RATE 1S		8 FAIL/18***GHRS
166	SI.GP.MECT	XTMRL TRE	058E	. 053724		52	286A	. 166		
2 3	SI. CP. DECT	STATE TOP	9300	45 240		G K	5	919.		
525	SI.GP.RECT	SAT JANTX		. 678144		22	28A	144		
	24. TOTAL	45.4256 MILLION HOURS	L ION H	ION HOURS		FAILURES	5	PATE 15		8 FAIL/10**6HRS
174	S1.GP, PECT	SUB JAN	9518	2.369		35	.25A	.2		
151	SI.GP.RECT	SUB JAN	9159	485.645	~	35	584	. 2:		
150	S1.GP.PECT	SUB JAN	9150	38.797		35	58A	.2		
175	S1. GP. PECT	SUB JAN	9518	2.369		35	- T	.2		
921	S1.GP.PECT	SUB JAN	9518	971.29	•	32	.25A	2.		
	*****************************	*******	*****	************	****	******	***********	************	**********	CANADA SERVICE SERVICE SERVICE SERVICE
	25. TOTAL.	1628.4 MILLION HOUPS	LION H	OUPS	2	FAILURES		RATE 15		. 123427E-2 FAIL/10**6HRS
88	189 S1.GP.PECT	SUB MIL 814 1.5	914	1.5	•				***********	
1		1.5 MILLION HOURS	L FON H	OURS	8	FAILURES	FAILURES	PATE 15		PATLURES PATE IS 8 FAIL/10/20/20/20/20/20/20/20/20/20/20/20/20/20
69		GF JANTX 851C .032 GF JANTX 851C .223	951C 851C	. 83 2 .223	9 6	25 25	25 30A 25 12A		FAST RE	FAST RECOV RECT FAST RECOV RECT
14.	27. TOTAL	.255 MILLION HOURS	T 10H H	oues	8	FAILUPES	5			0 FAIL/10**6HRS
69	67 SL.GP.RECT.FAST REC 69 SL.GP.PECT.FAST PEC	NS JANTX 851C .013 NS JANTX 851C .092	951C 951C	.013 .092	00	35 384 35 124	30A 12A	.2	-	FAST RECOV RECT
	28. TOTAL	. 185 MILL TON HOURS	L TON H	OURS	9	FAILURES	5	RATE IS	*	9.4************************************
- S - S - S - S - S - S - S - S - S - S	591 51.0P.PECT.FAST PEC 710 51.0P.PECT.FAST PEC 715 51.0P.PETT.FAST PEC 715 51.0P.PECT.FAST PEC	SAT JANTX 858E .092988 SAT JANTX 858E .019536 SAT JANTX 858E .019536 SAT JANTX 858E .019536	959E 958E 958E 958E	.892388 1.36752 .819536 .819536		22528 88888	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	8888		
-	29. TOTAL	1.54842 MILLIOH HOUPS	LION H	Squo		FALLURES	MATTER STATES TO THE STATES OF	FHIE IS	*****	D FAIL/18**6HRS
190	51.6P.516 51.6P.516	HI 045 .003766	945 945	.093766	00	95 .4A	44.	***********		************
	*************************	*****************	****	******	***	***	*********	*****	*****	************

\$1.69.516 \$1.69.516	**************************************	PATE IS	PES CONTRACTOR	FAILURES		MILLION HOURS	3861.62 MILI	3861	TOTAL	33. 70	
\$1.0F.516 \$1 JANTX \$45 \$1056 \$5 \$1530 \$8 \$1.0F.516 \$1 JANTX \$45 \$10756 \$1 \$1 \$1084 \$108	516	5.	.25A	37		951A 9578	JANTXV	88		S1.GP.S16 S1.GP.S16	195
\$1.GP.51G #1 JANTX #45 .083766 9	8 FAIL/18**SHRS	RATE 15	RES		****	LION H	778 MIL	. 63		32.	
\$1.66.516 \$1 jahrit \$45 .083766 \$5 .1554 \$94 \$1.66.516 \$1 jahrit \$45 .083766 \$5 .1554 \$94 \$1.66.516 \$1 jahrit \$45 .083766 \$5 .44 \$95 .44 \$1.66.516 \$1 jahrit \$45 .083766 \$5 .44 \$95 .44 \$1.66.516 \$1 jahrit \$45 .68256 \$5 .46 \$95 .44 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$91 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$91 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$92 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$92 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$92 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$92 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$92 / 256 \$1.66.516 \$41 jahrit \$45 .68256 \$5 .1564 \$92 .1564 \$1.66.516 \$41 ja	******************	**************	.75A	Articles and	.002151 0	926	JANTX	P.C		S1,GP,S16	1
\$1.6P.516 \$1.5P.516 \$2.155A \$8 \$1.5P.516 \$8 \$8.155A \$8 \$8.155A \$8 \$8.155A \$8.155A			. 4.		.868296 8	929	JANTA	₹ ₹		S1.6P.S16	N 4
\$1.6P.516 \$1.5P.516 \$2.155A \$8 \$8.155A \$8 \$8.155A \$8 \$8.155A \$8 \$8.155A \$8.155A			4		.001875 0	926	XTHAL X	2		S1.GP.516	
Si.GP.SIG All JANITY 645 .003766 0 55 .126A .004 Si.GP.SIG All JANITY 645 .03766 0 55 .126A .004 Si.GP.SIG All JANITY 645 .00752 0 55 .126A .293 Si.GP.SIG All JANITY 645 .00752 0 55 .060A .215 Si.GP.SIG All JANITY Adv .007525 0 55 .060A .215 Si.GP.SIG All JANITY Adv .007525 0 55 .060A .215 Si.GP.SIG All JANITY Adv .007752 0 55 .126A .016 Si.GP.SIG All JANITY Adv .007766 55 .150A .0072 Si.GP.SIG All JANITY Adv .007766 55 .160A .0035 Si.GP.SIG All JANITY Adv .007766 55 .160A .0035 Si.GP.SIG All JANITY <td></td> <td></td> <td>.2A</td> <td></td> <td>. 666158 6</td> <td>926</td> <td>MATA</td> <td>\$</td> <td></td> <td>SI.GP. SIG</td> <td></td>			.2A		. 666158 6	926	MATA	\$		SI.GP. SIG	
SI.GP.SIG AI JANTX 045 .093766 I 5S .155A 0044 SI.GP.SIG AI JANTX 045 .03766 I 5S .156A .004 SI.GP.SIG AI JANTX 045 .087766 I 5S .156A .293 SI.GP.SIG AI JANTX 045 .087766 I 5S .16A SI.GP.SIG AI JANTX 045 .087766 I 5S .176A .215 SI.GP.SIG AI JANTX 045 .087732 I 5S .176A .215 SI.GP.SIG AI JANTX 045 .087766 I 5S .126A .062 SI.GP.SIG AI JANTX 045 .087766 I 5S .126A .062 SI.GP.SIG AI JANTX 045 .087766 I 5S .156A .083 SI.GP.SIG AI JANTX 045 .087766 I 5S .156A .083 SI.GP.SIG	8 FAIL/18**GHRS	RATE IS	RES	FAILU	URS 6	H NOI	982 HILI	. 289	TOTAL	31.	
SI.GP.SIG All JANTX 045 .003766 95 .155A SI.GP.SIG All JANTX 045 .003766 95 .125A SI.GP.SIG All JANTX 045 .003766 95 .125A SI.GP.SIG All JANTX 045 .003766 95 .44 SI.GP.SIG All JANTX 045 .003766 95 .44 SI.GP.SIG All JANTX 045 .003766 95 .44 SI.GP.SIG All JANTX 045 .003766 95 .126A SI.GP.SIG All JANTX 045 .003766 95 .156A SI.GP.SIG All JANTX 045 .003766 95 .154A SI.GP.SIG All JANTX 045 .003766 <td></td> <td>.5526</td> <td></td> <td>55</td> <td>. 887532 8</td> <td>845</td> <td>JANTX</td> <td>Ā</td> <td></td> <td>S1.GP.S1G</td> <td>120</td>		.5526		55	. 887532 8	845	JANTX	Ā		S1.GP.S1G	120
SI.GP.SIG All JANTX 045 .003766 95 .155A SI.GP.SIG All JANTX 045 .007376 95 .125A SI.GP.SIG All JANTX 045 .007376 95 .125A SI.GP.SIG All JANTX 045 .007376 95 .44 SI.GP.SIG All JANTX 045 .007376 95 .44 SI.GP.SIG All JANTX 045 .007376 95 .44 SI.GP.SIG All JANTX 045 .003766 95 .126A SI.GP.SIG All JANTX 045 .003766 95 .156A SI.GP.SIG All JANTX 045 .003766 95 .154A SI.GP.SIG All JANTX 045 .003766 <td></td> <td>9</td> <td>. 999659</td> <td>25</td> <td>. 993766 9</td> <td>945</td> <td>JAHTX</td> <td>ē</td> <td></td> <td>S1.6P.S16</td> <td>*</td>		9	. 999659	25	. 993766 9	945	JAHTX	ē		S1.6P.S16	*
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SI.GP.SIG All JANTX 045 .003766 0 55 .153A SI.GP.SIG All JANTX 045 .003766 0 55 .00033A SI.GP.SIG All JANTX 045 .003766 0 55 .00033A SI.GP.SIG All JANTX 045 .003752 0 55 .4A SI.GP.SIG All JANTX 045 .003752 0 55 .4A SI.GP.SIG All JANTX 045 .003752 0 55 .000A SI.GP.SIG All JANTX 045 .003756 0 55 .00A SI.GP.SIG All JANTX 045 .003766 0 55 .126A SI.GP.SIG All JANTX 045 .003766 0 55 .126A SI.GP.SIG All JANTX 045 .003766 0 55 .35A SI.GP.SIG All JANTX 045 .003766 0 55 .35A SI.GP.SIG All JANT			.15A	55	. 993769	845	JANTX	F F		91.6P.S16	
SI.GP.SIG All JANTX 045 .003766 0 55 .153A SI.GP.SIG All JANTX 045 .003766 0 55 .00033A SI.GP.SIG All JANTX 045 .007532 0 55 .4A SI.GP.SIG All JANTX 045 .007532 0 55 .4A SI.GP.SIG All JANTX 045 .007532 0 55 .4A SI.GP.SIG All JANTX 045 .007532 0 55 .000A SI.GP.SIG All JANTX 045 .003756 0 55 .00A SI.GP.SIG All JANTX 045 .003756 0 55 .05A SI.GP.SIG All JANTX 045 .003756 0 55 .126A SI.GP.SIG All JANTX 045 .003756 0 57 .126A SI.GP.SIG All JANTX 045 .003756 0 57 .126A SI.GP.SIG All JANTX </td <td></td> <td></td> <td>. 151A</td> <td>53</td> <td>.003766 0</td> <td>945</td> <td>JANTX</td> <td>Œ</td> <td></td> <td>S1.6F.S16</td> <td>107</td>			. 151A	53	.003766 0	945	JANTX	Œ		S1.6F.S16	107
SI.GP.SIG All JANTX 045 .003766 0 55 .153A SI.GP.SIG All JANTX 045 .003766 0 55 .126A SI.GP.SIG All JANTX 045 .003766 0 55 .40033A SI.GP.SIG All JANTX 045 .003766 0 55 .40 SI.GP.SIG All JANTX 045 .003752 0 55 .126A SI.GP.SIG All JANTX 045 .003752 0 55 .000A SI.GP.SIG All JANTX 045 .003752 0 55 .000A SI.GP.SIG All JANTX 045 .003752 0 55 .000A SI.GP.SIG All JANTX 045 .003752 0 55 .126A SI.GP.SIG All JANTX 045 .003752 0 55 .126A		2985	1578	35	993756	645	ZINET X	ī ā		SI.GP.516	103
SI.GP.SIG A1 JANTX 045 .003766 0 55 .153A SI.GP.SIG A1 JANTX 045 .03766 0 55 .126A SI.GP.SIG A1 JANTX 045 .007532 0 55 .4A SI.GP.SIG A1 JANTX 045 .007532 0 55 .4A SI.GP.SIG A1 JANTX 045 .007532 0 55 .126A SI.GP.SIG A1 JANTX 045 .007532 0 55 .000A SI.GP.SIG A1 JANTX 045 .007532 0 55 .000A SI.GP.SIG A1 JANTX 045 .008532 0 55 .000A SI.GP.SIG A1 JANTX 045 .008376 55 .751A		.23	.1264	25	. 007532 0	945	SHITX	F		\$1.6P.516	102
SI.GP.SIG AI JANTX 845 .083766 0 55 .153A SI.GP.SIG AI JANTX 845 .08766 0 55 .126A SI.GP.SIG AI JANTX 845 .083766 0 55 .40 SI.GP.SIG AI JANTX 845 .083766 0 55 .40 SI.GP.SIG AI JANTX 845 .083766 0 55 .40 SI.GP.SIG AI JANTX 845 .083766 0 55 .126A SI.GP.SIG AI JANTX 845 .083766 0 55 .060A		19.	. F51A	55	0.003766 0	645	JAHTX	A.I		S1.GF.516	105
SI.GP.SIG All JANTX 845 .003766 0 55 .153A SI.GP.SIG All JANTX 045 .003766 0 55 .126A SI.GP.SIG All JANTX 045 .003732 0 55 .4A SI.GP.SIG All JANTX 045 .003732 0 55 .4A SI.GP.SIG All JANTX AdS .007532 0 55 .126A SI.GP.SIG All JANTX AdS .007532 0 55 .000A			. 878а	55	. 887532 0	645	JANTX	P.		51.GP.SIG	129
SI.GP.SIG		.215	.0600	55	.060256 0	945	JANTX	. F		S1.6F.S16	94
SI.GP.SIG		110.	1000	8 2	0 0015100	043	NINE T	= 3		51.67.516	
SI.GP.SIG AI JANTX 845 .083766 0 55 .1534 SI.GP.SIG AI JANTX 845 .083766 0 55 .1264 SI.GP.SIG AI JANTX 845 .083766 0 55 .080334			₹.	55	.007532 8	845	THE	Ŧ :		S1.6P.516	011
SI.GP.SIG AI JANTX 845 .083766 0 55 .153A SI.GP.SIG AI JANTX 845 .03766 0 55 .126A		.293	. 888334	55	. 9937566	645	JANTX	a.		S1.6P.S1G	211
SI.CP.SIG 01 JONTX 845 893756 0 55		.884	. 126я	55	. 93766	645	STHE	4		S1.6P.516	
		9	.153я	55	. 9937566	845	JANTX	E B		S1.GP.S1G	4

1											
21.6	SI.GP.SIG	5	M	944P	1452.89	s	22		٤.	516	
51.6	P.SIG	45	F	844A	1.237		25		٤.		
51.6	51.6P.516	*	JAN	6449	.645		52		.3		
51.6	51.6P.516	49	JAN	4	6087.72	33	22				
51.6	51.62.516	35	JAN	444	1386.823	61 6	52		.3	516	大大大 不一次一个一个一个
51.6	S1.GP.516	45	JAN	9559	321.865	5	30				
51.6	S1.6P.51G	29	JAH	8558	12.785		30	.ZA			
51.6	51.6P.516	3	181	8558	193.297		38	. 8861A			
51.6	S1.6P.916	5	AR.	8558	11.601		30	. 85A			
81.0	31.09.316	3	191	855B	158.483		30	. 89839			
0	61.60.616	3	10.	855B	145 193		30	10			
	21 00 00 10	, %	1	8558	1458 932	81.	20	910			
0	20.00.10		3	9888	921		30	Bodo			
51.6	SI, GP. SIG	3	, E,	8558	28.834	, m	38	.498A			
******	34. TOTAL	112	1246.2 MILLION HOURS	LL ION	DURS	96	FAILUPES	ES	RATE 15	1	. 889272E-2 FAIL/IBMSHRS
51.6	**************************************	25	JANTX	9510	.228		25	**********	.2	kakaka	ok with a second second second second second
		2	THO			•	36				
31.6	7.316	3 1	× 1	316	- ;		9		,.		
51.6	51.68.516	5	MALX	9510	79.		52		2.		
51.6	51. GP. 516	35	JANTX	9510	1.388	•	52		.2		
51.6	SI.GP.516	3	JAHTX	9510	.445		52	584	.2		
51.6	S1.6P.516	3	SPHTX	9510	829	•	52	.BIA	.2		
51.6	S1.GP. S1G	5	JANTX	9510	2.885		25	. BIA	.2		
51.6	Sr.GP.SIG	3	SANTX	9515	84.		25	30	.2		
51.6	51.62.516	3	JANTX	9510	.846		25	. AZA	.2		
51.6	S1.6P.S1G	3	JAHTX	855A	.133		35			DUAD	•
51.6	51.69.516	3	JANTX	855A	2.052		35		.3		
51.6	51.GP. 51G	5	JAHTX	855A	.267		35				
51.6	SI.GP. 51G	3	JANTX	855A	49.117		35	.8289			
51.6	S1.GP. S1G	19	JANTX	855A	1.834		35	B1000.			
SI.G	S1.6P.516	3	JANTX	855A	287.838		35	.0100			
21.6	51.69.516	25	JANTX	A55A	1.968	•	32	The second second			
51.6	SI. 6P. SIG	35	JANTX	A55A	542.344		35	2800			
81.5	S1. CP. S1C	32	INNTX	0550	272 939	7	35	MANA			
81.5	51. CP. 616	3 23	INT	8550	111	. 4	2			CHION	-
	er co. ere	3 2	TONT	0550	94 756		35	1000		-	
	010 00 000		Town	02.0	067		1			4010	
2000	200		1	HO. I	200.		2 :			100	
51.15	4.5 SI.5F.5Hs	10	21111		2) CG HCCH CINE 19	-	55	***************************************			
	35. 10TM.	1305	305.21 MLL TON HOURS	H 10H F	OUPS	21 F	FAILUPES	5	PATE 1	S .1588	.158894E-1 FAIL/10**6HPS
51.6	527 S1.6P.516	45	SHITTEN DES	8.40	.356390	0	30	GF JAHTYV 66.8 , 356390 0 30	6.3		(.3
51.6		15	JOHEN	658	1.211726 9	9 9	30		<.3		6F JANTON 058 1,211726 9 39 4.3
*******	TAXABARAKA KA							****			***********

2 00 10	-	8	LOICE	290	120	- 4	20		-	
S1.6P.516	2 9	5 15	LOUER	963	10.4	2 2			: 2:	
S1.6P.S16 S1.6P.S16	22	5 5	LOUER	953	5429	1.69	55	Œ.	n, n,	\$16.5TAB15TOR \$16
37. 101	TOTAL	. 5667.	7.4 HI	.4 HILLION HOUPS	:	635	35 FAILUPES	53	RATE IS	. 112844 FAIL/18**6HRS
27 SI GP. SIG	16	19	JAN	954	678		30	.2A	8.	******
\$1.GP.516		64	JAH	999	9167	0	30	750149		
S1.6P.516	91	5	JAN.	054	1111	0	30	.75н	8.	
S1.GP.516	2	H9	JAH	954	.333		38	Œ.	8.	
S1, GP. 51G	92	5	JAN.	654	39.212		30	.24	8.	
S1.GP.51G	91	5	JAN.	954	.312	0	3.0	.01A	8.	
S1.GP.S16	16	H9	JAN.	454	260.	0	30	₩.	6,	
S1.GP.51G	16	5	JAH	654	.416		39	45	0,	
\$1.GP.S16		H9	NAI	054	.928		92	.019	œ.	
38. TOT	. TOTAL	32.4	32,4786 MILLION HOUPS	1 10H H	OUPS	0	FAILUPES	.5	PATE 15	9TE 1S 0 FAIL_10**5HPS
S1.GP.51G	16	119	Gri Jantx 865 .2499	990	.2499	9	30	1800		
S1.6P. 916	10	H9	JANTX	990	. 1249		30	181191		
S1.6P.516	91	15		990	5.2868	2	30	1919		
\$1.60.516		159	JANTX	998	9991.	0	30	400110		
39. TOT	TOTAL	5.7	5.7474 MILLION HOUPS	T ION H	OUPS	2	FAILURES	53	PATE 15	FAILURES :347983 FAIL 10**6HRS
S1.GP.516	16	200	Nei	03290	NS JAN 83296 15.848	9	40			
40.	40. TOTAL		15.84 MILLION HOUPS	L 1011	Salio	5	FAILUPES	55	RATE 15	A FAILUPES RATE IS B FAIL/18**6HRS
S1.6P.516	16	HS	NS JANTX 051C 1.175	9510	1.175	•	35	35 .P.IA	2.	
51.GP.51G	911	NS	JANTX	9510	. 185	0	35		.2	
S1, GP. S1G	911	HS	JAHTX	951C	.311	0	32	. 61A	.2	
S1.6P.51G	91:	HS	SANTX	951C	.62	9	35	. 82A	.5	
51.GP.51G	971	SE	JANTX	9510	. 183	0	32	34	.2	
51.GP.51G	9	2 9	XILL	200	9000	0 0	2 2		ic	
SI, GP . SIG	2 9	2 3	TOWNER	9510	25.5		3 5			
S1.GP.516	91	3	JAHTX	9510	.183	0	33	58A	.2	
41. T01	. TUTAL	2.	2.834 MILLION HOURS	LL 10N P	OUPS	9	FAILURES	55	PATE 1S	8 FAIL IN WEHRS
S1, GP, S1G	116	SA		958A	50.693	8		4881%	.2	
S1,6P.S16	911	SAT	JANTX	959E	303616	60	52	299119	.084	
S1.GP.S1G	911	SOT	JANTX	9288	. 8448		22		.3	
S1.6P.S16	-			-		•		-	•	

ENTPY	ENTRY FART DESCRIPTION	EN	ENV QUALITY SACE	SPICE	HESTING FAIL TEMP PATING	FAIL	TEMP	PATING	STRESS	COMPENTS
508	S1.GP.S1G	SAT	JANTX	958н	18.814	6	52	200110	.2	
497	31.6P.516	SnT	JAHTX	0589	26.240		52		4.	
174	\$1.67.516	SAT	JANTX	9850	.478		25		.2	
¿us	S1.6P.516	SAT	JANTY	9590	CPPU.	6	52		7.	
5000	\$1.64.516	SOT	MATTE	959E	. 0137592	•	52		500.	
2.19	\$1.67.516		HHTX	BESE	. A47.44	•	52	30110	.036	
491	51.GP.S1G		JANTY	052	.36		25			HI-VOLT
523	SI.6P.516	SAT	Janta	959E	.33208	0	52	400rH	189.	Company of the San
98-	SI.GP.516		HAT	952	269.82		21	-	2.	516
33	51.67.516		HILL	2000	.028464		2	400FH		
65.5	SI-6P-516	# #.	STHE	058E	918976		33	40010	.050	
	42. TOTAL	410.1	116.173 PILL 10H HOUPS	L 1011 H	Sano	9 5	FAILUPES	**************************************	RATE 15	######################################
=	51.68.515	Bits	In	8218	051B 14.214		35	. ABSA	.2	******
5	31.6P.516	CHIP	NOI	818	658.582		35	4		
1.5	\$1.6F.5J6	ens .	Tari	81518	35,535	6	35	.75A	.2	
i.	51.GP.STG	THE STATE	THE	8518	99.022		35	.8659	.2	
•	\$1.46.516		JAN	8218	7.107		35	.024	.2	
5	51.68.816	SUB	TAN	9518	5849.861	61	35	. IA	.2	
1	51.67.516	ans	IAN	8518	184.782		35	.2A	.2	
	51.66.316	SUB	Jen	9518	1686.720	3	35	. BIA	.2	
6.	SI, GP. SIG		JAN	9518	56.956		35	35	.2	
35	SI-GP-SIG	SUB	NH.	9518	2990.158	8	32	40	2.	
	SI.GP.SII	SuB	HH	8518	SUB JAN 8518 459.586	2	35	. 892A	.2	
		11842	11842.6 MILLION HOURS	L10N H		32 F	FAILURES	5	RATE 15	.27821E-2 FAIL/10**6HFS
20		8018	SUB LINER	9518	0518 4.738		35	₫.	.2	.2
	44. TÖTAL	4.7	4.738 MILLION HOURS	LION H	4.738 MILLION HOURS 0 FAILURES	9 5	FAILURES	8	•	0 FAIL/10*6HPS
57		SHE TILL SUB TILL	ĦĦ.	914	SIE III. 014 7104.322 14 40 IU SUB III. 014 196.9268 0 45 IU	4.0	6 5	*	******	***********************
	45. 10THL	7301.	301.25 HILLTON HOUPS	LTON	7301.25 MILLION HOIPS 14 FAILURES	14 F	FAILURES	*	PATE 15	FDTE IS . 1917-49E-2 FAIL/10** FHPS
167	167 C1.167.54	ريو	JAN	0490	GF JAN 8494 95.031	-	35			************
	71.6F.CU	4	IAN	P-190	125.5	0	35		r.	HED PLE
ž ;	3. cr. se	1 5 (TOH	9.130	1462, 377	4	21		v. ı	
	7.7	3 33	13	D Febru	172,124	0	340		ūν	
	46. THEAL	3172.	3172.05 HILLION HOUPS	1001	3172.05 HILLION HOURS 5 FAILURES	2	FAILUFES	5	PATE 1S	PATE 15 . 15964E-2 FAIL/10++6HPS
17.9	541 S1.4P.SU	19	IGNTX	OF.B	GF GENTX BEB RESERVED O 70		9:	******		***************************************

408 S1.GP.SU 89 \$1.GP.SU 88 \$1.GP.SU										
		10	MINUTA	0550	202 6	•	35			
			NI NO.	040	21 62		4	250	ď	CE 884 01 284
		99	TONT	949	138 222		4	820		-
		, 5	INTX	849	2291 19		4	20		80× 01
	13	3	JANTX		96.9		\$	30	i v.	GF 88x. A1 28x
47. 101	. TOTAL	2472	2472.75 MILLION HOUPS	LL 10N 1	HOUPS	4	FAILURES	S	PATE 1S	.161763E-2 FAIL/18**6HPS
619 SL.6F.SW	2	5	Jien	990	GH JIAN 066 . 4938		36	*****	*******	······································
48.	48. TOTAL . 499 FILLION HOURS	4.	.4998 HILL ION HOURS	LL 10N P	OURS	9 6	FAILURES		PATE 1S	B FAILURES B FAILURES
605 51.GP.SU	2		JANTX	999	GII JANTX 866 1.4162		36	9 38		
.67	49. TOTAL		1.4162 MILLION HOURS	- NOI 1	IOURS		FAILURES	5	RATE 15	1.4162 MILLION HOURS 8 FAILURES RATE IS 9 FAIL/10**6HPS
548 \$1.00.90		SAT	SAT JANTX	078E	SAT JANTX 058F .004744		25	400rp	.188	*************************
		SAT	MANTE	9050E	.298736		52	1814	991.	
529 S1.6F.SU		SAT	JAMTX	BSBE	1.85965		52	188rm	969.	
497 ST. GF. SW	>	SAT	JANTX	9590	2.962		52		4.	
	3	SAT	MANTX	RSBE	.313184		52	1914	.186	
558 S1.6P.5W	,	SAT	MALE	BESSE	.303616		52	and a	.638	
588 51.GP.Su	3 3	SAT	XINT.	959E	289384		25	IBM	100	
		SAT	JANTX	858E	1.43269	0	52	199179	960	
582 51.6P.SU	2	SAT	JAHTX	959F	. 493376		25	1919	.616	
	2	SAT	JANTX	BSBE	.837952		52	50rm	901.	
	2	SAT	XINE.	958E	. 085392	0	52	200rm	991	
577 SI.GF. SU	3	198	STATE OF	959E	123344		22	ZBBFR	916	
	3 7	100	TONT	ASSE	366131		S K	1000	100	
		Top	TAITX	PSAF	N28464		3 2	TOTAL	994	
	2	561	JANTX	953E	.645184		52	199119	190.	
570 S1.6F.SU		SAT	JANTX	988E	.075984		52	18119	991.	
569 ST.6P.5W	3	THE	JOHTX	BUSE	.161296		52	19119	991.	
		SAT	JHHTX	PSSE	.208736		52	20014	. 050	
	3	SAT	JANTY	956E	. 178784	0	52	200rm	991	
	3	SHT	JANTX	PS8E	.695192		52	1914	601.	
150 SI. IS. 36	***********	*******	SHI JIMILY	135E	17974.		0	101	. Int	***********************
	50. TOTAL	10.7	111 156.7.0	THE THE HOUSES	10,7941 THLL Intt 1898'S	0	FAILURES	S	PHIE IS	:
	78	99	tott	9439	36.212	-	35		5.	
471 SI.PECT		15	Juni	0.190	9.599	0	35		.5	
		50	TON	9439	5.759	c	32		۲.	AVALANCH
		9	1600	BASH	23.997		35		v. 1	
475 SI.PECT		15	GF JAN 8434 559	0439	559	9	35	35	5.	HUND INCH

ENTP	ENTRY FART RESCRIPTION	CHA	CHY OUGHLTY SPCE	SPCE .	HRS+10+6 FAIL TEMP RATING	FAI	IL TEM	PATING	States	COLFFITS
984		13	Marty	640	1.989	-	8		۶.	36
		-	SANON HOLLAND See.	1,100	HOURS	-	FATLURES	ES	1.989 THELTON HOUSS I FAILURES PATE IS	Sacces Fall 18 resiles
800		১১১	GF JANTY 855A .740 GF JANTY 855A .4 GF JANTY 855A .033	0559 0559 0559	.240 .033	0-0	9 35 9 35 35		1- N- 1-)
			.673 HILLION HOUPS	1011	HOUPS	-	FAILUPES	ES		1.49508 FAIL<18**6MPS
367		ē		0.45	845 .883766	0	55	55		************************
	×	.003	003766 HILLTON HOUPS	L 10N	.003766 HILLION HOUPS		FAILURES	FAILURES	PATE 15	RATE IS G FAIL IR FEMER
351	S1.2EN	P	TARTY	0.47.	AT MARTY 045, .003766		55	db.	.3	*************************
188	S1.2EN	E .	JAHTX	0.45	992200		55	A191.	1.	
27.4	н32-15	10	JUNT.	945	. 903766	0	55	B210.		
355	S1.ZEN	E .	IGHTX	949	.003766		25			
80	SI.26H	= 3	Tanta.	043	901500		5 8		. "	
392	SI.ZEN		JAMTX	848	.003766		35	.6490		
28%	S1.7EH	18	SHITTX	645	. 803766	•	55	.1267₽		
371	S1.7EN	Iu	JAHTX	945	. NO7532	0	35	. 87A	.3	
8.28	н32-15	H	JAHTX	645	. 993766	0	55	.264	.3	
1001	132.18	æ :	MIX	945	. 987532		25		٠.	
69	SI-Zen	= -	NI NI	043	.003766		25			
240	51.251	3	TOTAL	845	90 22 00	0 0	20	90		
27.3	1132.18	•	JENTX	845	.003766		55	9.40	.3	
375	81.ZEII	H	JANTX	645	. 893766		55	37.20	.3	
364	SI.ZEH	14	JAHTX	945	. 893766		55		E.	
24	ыз2-15	F	JOHTX	045	.093766		55		.3	
37.0	51Тн	E	JANTX	945	. 903766		25		.3	
389	51En	In	MATTX.	042	.003766		55		r.	
362	\$1.7EH	H .	JOHLE	645	.003766		55		.3	
366	SI.cm	æ ;	MIX	945	.003766		22		m. 1	
000	21.70	= 3	XIMIX	643	901256		6 5		2.	
73.1	11.710	2	TANTX	945	ANSTER.		3.5			
200	S1.7ff	10	JOHTX	Ade	SF8780.		55			
\$ 0.00	S1.7fm	111	Junt >	ndf.	. mist766	0	55	APLA.	.3	
2:5	51.71n	H	JOHEN	1.45	. MATTER	0	55	. 178A		
192	sp.zen	-	MHTX	945	.003766	•	55		٠.	
9.4	S1.7FH	HI.	THIRTY	0.45	.no.532	0	55		.3	
21.5	S1.7FH	Ŧ	FORTX	0.45	992200	0	55		r:	
263	417EM	91	THE	045	. 903766	•	52	.1790	m.	
186	C1TH	DI DI	IANT	0.45	907.66	•	25	DER TIA	7.	

115	FILLEY PURT NESCRIPTION	F 14	ENV CONCLIN SPLE	SELE		-	שייים בעוד ובוב עשו זעם	200	
052	SL.7FN	in	MAINTX	045	.003766		55 .40	.3	
200	15.15	10	Martx	945	.007532			19.	
	137:16		Trees	9.16	992200		55 680		
	SI-cen	:	V. 1	0.00	001000				
225	F1:50	=	HANTE	6.15	. 983766			?!	
381	S1.ZFN	B	Jantx	945	.007532	0	55 .649A	٠.	
355	S1.2EH	le el	JANTX	045	. 993756		55	£.	
SATE .	31.7EH	I.O	Jentx	9-15	.903766		55	10.	
	S1.201	E		645	.887532	0	55 62.64	.3	
****	200	******	********	****	*********		***********	31 2100	COTT TO COTT
	55. 1014	186	HOLE HILL HIM HOURS		HOLLES.		PHILUKES	CHIE 13	CHIE IS G HIC ID TO THE STATE OF THE STATE O
	ST. 25H	9	HI INNTX 856		961999		đ.	4.	
250	100 TEN	10	INTX	956	966808		45	4.	
900	137:16	1	INTX	856	BR4292	•	3	4	
	137.16	2 2	TANT	956	PARTIE		4	.4	
200	137:17 21 364	-	TANTX	956	. AR1184		\$	•	
	73. 13	100	MATA	nsk	996749		45	7	
	100	23	IONTX	956	871008			4	
	***************************************	*****		******	*************	***	**************	*****************	***********************************
	56. T0 F0L	. 013	RISIBI MILLION HOUPS	LION H	Samu	E .	FAILURES	PATE 15	8 FAIL/10**6HPS
	11 THE	63	WITHEL	8519	S. 1987X 8519 36889, 13	,	18 .6640		
	SI.JFW	99	INHTX	9519	1253.717	-	10	5.	
\$25	SI.2TH	85	JANTXV	051A	1450.729	-	10		
162	SI.26H	83	JANTYV	9519	1199.986	-	18 .821A	r.	
290	51.2tm	83	JANTXV	051A	411.936		18 .0284	s.	
252	S1.2EH	85	JANTAN	857B	.755		37	2.	
253	S1.2EH	99	JAHTXV	8258	.755		37	۲.	
250	S1.7EN	89	JAHTXV	9250	1.508		37	۲.	
251	Si.ZEII	85	JAHTXV	9259	.755		37	2.	
	1019	40.46	0-189.3 MILLION HOURS	MILL ION HOURS	OURS	7 F	FAILURES	PATE 1S	RATE 15 . 173228E-3 FAIL/10**6HPS
294	51.7FN	95	JAN	8-44A	844A 55.175	18	25	5.	
3 30	SI.ZEN	29	JAN	844B	22.582	-	52		
	SI.ZEN	45	JAN	0558	12.718	4	30	r.	
560	SI.ZEN	3	INN	8258	2.210		30	r.	
260	SI.ZEN	25	MAL	955B	4,693		36	E.	
3.45	ST. 25N	15	JAN	9229	3.351	0	30		
285	*1.2F#	29	1911	855B	210.981	10	30	.3	
455	S1.7EH	35	JAN	6499	15.088		35	5.	
221	SI.ZEN	49	JAN	6499	656.		33	s.	
458	S1.2EN	45	JAH	6499	4.682		35	٥.	
690	81.2ЕН	45	JOH	6490	13.438		35	s.	
961	S1.7EH	25	JAN	9490	3.017	-	35	s.	
163	S1.2FN	45	JAN	6499	4.682	-	35	s.	
17.0	S1, ZEN	45	Mer	043B	5.739	-	35	5.	

N32.12 698									
	5	JAN	949A	33.234		35		5.	
NJC 15	25	JAN	8494	19.198	-	35		· ·	
31:-	15	JAN	6499	6.935		35		· ·	
S1.2EN	99	JAH	0490	4.602	•	35			
	5	JAN	6498	185.972		35		. s.	
58. TOTAL	. 698	98.186 MILLION HOUPS	L 10N H	Saino	49 F	FAILUPES	ES	RATE 15	. 965778 FAIL/10**6HPS
***************************************	35	CE LOUTY DELL DAG	20.00	976		*	*********	*************	*****
SI.ZEN	. 10	JANTX	9510	2.318		2 2		, .	
SI.ZEN	15	JANTX	9510	.064		52		. *	
S1.2EH	5	JANTX	9510	.823		52			
SI.ZEN	3	JAHTX	9510	.133		52		. 2.	
SI.ZEN	15	JANTX	855A	2.425		35		ı r.	
S1.2EN	15	JANTX	855A	65.251	2	35		· m	
SI.ZEN	*5	MATA	955A	14.141	-	35		E.	
S1.ZEN	*	JANTX	955A	21.585		35			
N32.18	*	JOHTX	855H	6.484	-	35		ĸ.	
S1.ZEN	15	JANTX	955A	21.662		35		.3	
S1.ZEH	5	JANTX	646	.746		4		s.	GF 88x. A1 28x
S1.ZEN	5	JANTX	049	1.49		45		5.	E
S1.2EH	25	JAHTX	646	1.49	-	45		, v	BOX. AL
SI.ZEN	15	JAHTX	640	8.7		45			BOX.
SI.ZEN	3	IANTX	949	2.98	•	45			
SI.ZEN	3	JAHTX	649	.746		4			80%. 61
***************************************	*********	**********	*****	********	****	***	************	*************	***
59. TOTAL	156.	50.284 MILLION HOURS	L1011 H	.284 MILLION HOURS	S F	FAILURES	ES	PATE 1S	.332783E-1 FAIL /18**6HRS
N:	5	JANTXV	890	.142556		38		¢.3	
S1.2EH	5	JAHTXV	896	.213834		38		6.3	
SI.ZEN	45	JANTXV	898	.142556		38		ć.3	
		JANTXV	898	.871278		30			
	.578	578224 MILLION HOURS	LION H	OURS	9 F	FAILUPES	53	RATE 15	8 FAIL/10**6HPS
336 S1.ZEM	ь	LOUREP	699	77.16	66	38		. 1	
1132-15	35	LOILER	663	1.43		30		.2	
S1.7FH	25	LOUGER	150	36	31	55	. BIB.	5.	
SILTER	19	LOWER	653	22	40	25	. 6640	.5	
S1.7FH	25	LOWEP	953	191	174	55			
S1.75H	45	LOUEP	053	10	10	55		5.	
S1.2FN	45	LOUER	053	41	13	55	ы.	.5	
нэ2-15	45 GF	LOUEP	653	286	89	25	A7718.	5.	
SI-ZEN	25	LOUER	0.23	68	72	55	. 8344A	5.	
N32.12	5	LOUSEP	653	289	203	55	.848	5.	

Strict S						200				200	2000
Street	N32.12		15	JAN	954	.014		30		α.	
Sizeh Gir Jan 654 134 6 9 19 19 19 19 19 19 1	81.2EH		E	Jen	954	.722		30		6.	
91.2EH	S1.ZEN		15	JAN	954	.134		30		α.	
91.2ETH GF1 JRH 695 A 1745 9 39 10 .9 91.2ETH GF1 JRH 695 A 1846 9 39 10 .9 91.2ETH GF1 JRH 695 A 1846 9 39 10 .9 91.2EH GF1 JRH 695 A 1846 9 39 40 .9 91.2EH GF1 JRH 695 A 1846 9 39 40 .9 91.2EH GF1 JRH 695 A 1846 9 39 40 .9 91.2EH GF1 JRH 696 A 1846 9 39 10 .9 91.2EH GF1 JRHY 666 A 1846 9 39 10 .5 91.2EH GF1 JRHY 666 A 1842 9 39 10 .5 91.2EH GF1 JRHY 666 A 1842 9 39 10 .5 91.2EH GF1 JRHY 666 A 1842 9 39 10 .5 91.2EH GF1 JRHY 666 A 1842 9 39 10 .5 91.2EH GF1 JRHY 666 A 1842 9 39 10 <th< td=""><td>41.2FN</td><td></td><td>115</td><td>JAN</td><td>954</td><td>.264</td><td></td><td>30</td><td></td><td>e.</td><td></td></th<>	41.2FN		115	JAN	954	.264		30		e.	
Sizeh Gri Jah 654 648 9 30 10 7 7 7 7 7 7 7 7 7	N32'15		15	JAN	95.4	.745		30			
S1,221 GF1 JRH 654 469 9 9 9 9 S1,221 GF1 JRH 654 484 9 39 460 7 S1,22H GF1 JRH 654 614 9 39 60 8 S1,22H GF1 JRH 654 614 9 39 60 8 S1,22H GF1 JRHY 66 616 9 30 100 5 S1,22H GF1 JRHY 66 616 9 30 100 5 S1,22H GF1 JRHY 66 616 9 30 100 5 S1,22H GF1 JRHY 66 616 9 30 10 5 S1,22H GF1 JRHY 66 616 9 30 10 5 S1,22H GF1 JRHY 66 166 30 400H 5 S1,22H GF1 JRHY 66 166 316 30 400H 5 <td>N32.12</td> <td></td> <td>5</td> <td>JAN</td> <td>990</td> <td>.8416</td> <td></td> <td>36</td> <td>2</td> <td></td> <td></td>	N32.12		5	JAN	990	.8416		36	2		
91.2EM GH JAN 954 4.83 3 9 9.9	H32*15		64	NO.	854	690		36		6.	
Since City Diet Obs. Cale City City Diet City	81.ZEN		5	JAN	954	4.83		30			
51.2EN GH JAN 654 014 9 39 . 9 62. DIAL GH JAN 66 . 941 9 39 . 9 91.2EN GH JANN 66 . 9416 9 39 . 9 . 9 51.2EN GH JANN 66 . 9416 9 39 1U . 5 51.2EN GH JANN 666 . 9416 9 39 1U . 5 51.2EN GH JANN 666 . 9416 9 39 1U . 5 51.2EN GH JANN 666 . 9416 9 39 400m . 5 51.2EN GH JANN 666 . 9416 9 39 400m . 5 51.2EN GH JANN 666 . 9416 9 39 400m . 5 51.2EN GH JANN 666 . 9416 9 39 400m . 5 51.2EN GH JANN 666 . 9416 9 30 <t< td=""><td>H32.12</td><td></td><td>F. 6.11</td><td>JAN</td><td>990</td><td>.9416</td><td></td><td>30</td><td>400H</td><td>۲.</td><td></td></t<>	H32.12		F. 6.11	JAN	990	.9416		30	400H	۲.	
Sizeh Cat Jah CS4 C42 C4	S1.2EN		En GH	JON	954	. 614		36		Œ.	
62. TOTAL 6.9172 MILLION HOURS 4 FAILURES RATE IS 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 10 .5 51.2EH Gri Jahry 666 .0416 0 30 30 10 .5 51.2EH </td <td></td> <td></td> <td>5</td> <td>JAN</td> <td>954</td> <td>. 642</td> <td></td> <td>30</td> <td></td> <td>8.</td> <td></td>			5	JAN	954	. 642		30		8.	
S1.ZEH GFI JANTX 666 .0416 6 .39 .10 .5 S1.ZEH GFI JANTX 666 .1646 9 39 .10 .5 S1.ZEH GFI JANTX 666 .1249 9 30 .10 .5 S1.ZEH GFI JANTX 666 .1249 9 30 .400HJ .5 S1.ZEH GFI JANTX 666 .1646 9 30 .400HJ .5 S1.ZEH GFI JANTX 666 .1646 9 30 .400HJ .5 S1.ZEH GFI JANTX 666 .2163 9 30 .400HJ .5 S1.ZEH GFI JANTX 666 .2163 9 30 .10 .5 S1.ZEH GFI JANTX 666 .2416 9 30 .10 .5 S1.ZEH GFI JANTX 666 .2416 9 30 .10 .5 S1.ZEH HS JAN 83 .2 .400HJ .5 S1.ZEH HS JANTX 85 .27 <t< td=""><td>62</td><td>-</td><td>6.9</td><td>172 MI</td><td>11017</td><td>OURS</td><td>4 F</td><td>ATLURE</td><td>5</td><td>RATE 15</td><td>. 578269 FAIL/18**6HRS</td></t<>	62	-	6.9	172 MI	11017	OURS	4 F	ATLURE	5	RATE 15	. 578269 FAIL/18**6HRS
SI.ZEH GH JANTX 666 9416 9 30 1M S SI.ZEH GH JANTX 666 -1249 9 30 10U -5 SI.ZEH GH JANTX 666 -1249 9 30 400H -5 SI.ZEH GH JANTX 666 -1249 9 30 400H -5 SI.ZEH GH JANTX 666 -1649 9 30 400H -5 SI.ZEH GH JANTX 666 -1649 9 30 400H -5 SI.ZEH GH JANTX 666 -1649 9 30 400H -5 SI.ZEH GH JANTX 666 -1649 9 30 400H -5 SI.ZEH GH JANTX 666 -1649 9 30 400H -5 SI.ZEH GH JANTX 666 -1649 9 30 400H -5 SI.ZEH GH JANTX 666 -1646	S1.ZEH	*********	GH	JANTX	990	.0416	9	38	100ru	.5	******
S1.2EN GR1 JANTX G66 0, 6166 0 936 1U 5 S1.2EN GR1 JANTX 666 0, 4592 0 39 400HJ 5 S1.2EN GR1 JANTX 666 0, 4592 0 39 400HJ 5 S1.2EN GR1 JANTX 666 0, 4592 0 39 400HJ 5 S1.2EN GR1 JANTX 666 0, 4592 0 39 400HJ 5 S1.2EN GR1 JANTX 666 0, 6833 0 10 5 S1.2EN GR1 JANTX 666 0, 6833 0 10 5 S1.2EN GR1 JANTX 666 0, 6833 0 10 5 S1.2EN GR1 JANTX 666 0, 6466 0 39 10 5 S1.2EN GR1 JANTX 666 0, 6416 0 39 10 5 S1.2EN GR1 JANTX 666 0, 6466 0 39 10 5 S1.2EN GR1 JANTX 666 0, 6416 0 39 10 5 S1.2EN GR1 JANTX 666 0, 6466 0 39 10 5 S1.2EN GR1 JANTX 666 0, 6466 0 39 10 5 S1.2EN	N32.18		F9	JANTX	998	. 8416		30	2		
S1.ZEH GRI JANTX 666 1249 9 30 400HJ .5 S1.ZEH GRI JANTX 666 1249 9 30 400HJ .5 S1.ZEH GRI JANTX 666 166 9163 9 30 400HJ .5 S1.ZEH GRI JANTX 666 1666 9163 9 30 400HJ .5 51.ZEH GRI JANTX 666 1666 9 30 400HJ .5 51.ZEH GRI JANTX 666 1666 9 30 400HJ .5 51.ZEH GRI JANTX 666 1666 9 30 400HJ .5 51.ZEH GRI JANTX 666 1666 9 30 400HJ .5 51.ZEH GRI JANTX 666 1666 9 30 400HJ .5 51.ZEH GRI JANTX 666 1666 9 30 400HJ .5 51.ZEH HS <td>S1.7FN</td> <td></td> <td>3</td> <td>JANTX</td> <td>998</td> <td>1666</td> <td></td> <td>38</td> <td>2</td> <td></td> <td></td>	S1.7FN		3	JANTX	998	1666		38	2		
SI.ZEH GH JANTX 866 (1249) 30 (1804) 5 SI.ZEH GH JANTX 866 (1482) 30 (4981) 5 SI.ZEH GH JANTX 866 (1482) 30 (4981) 5 SI.ZEH GH JANTX 866 (1466) 30 (144) 5 SI.ZEH GH JANTX 866 (1466) 30 (144) 5 SI.ZEH GH JANTX 866 (1466) 30 (49014) 5 SI.ZEH GH JANTX 866 (1466) 30 (44614) 5 SI.ZEH NS JANTX 866 (1466) 30 (44614) 6 SI.ZEH NS JANTX 866 (1466) 30 (44614) 6 SI.ZEH NS JANTX 861 (1467) 35 (1467) 8 SI.ZEH NS JANTX 861 (1467) 35 (1467) 8 SI.ZEH NS JANTX 851 (1467) 8 35 (1467) S	N32.18		5	JANTX	990	.0416		30	488rt		
S1.ZEH GH JANTX 866 .9163 0 30 400HJ .5 S1.ZEH GH JANTX 866 .9163 0 30 400HJ .5 S1.ZEH GH JANTX 866 .0468 0 30 1W .5 S1.ZEH GH JANTX 866 .0468 0 30 1W .5 S1.ZEH GH JANTX 866 .1666 0 30 1W .5 S1.ZEH GH JANTX 866 .1666 0 30 1W .5 S1.ZEH GH JANTX 866 .1666 0 30 1W .5 S1.ZEH GH JANTX 866 .1666 0 30 1W .5 S1.ZEH GH JANTX 866 .1666 0 30 1W .5 S1.ZEH GH JANTX 866 .0416 0 30 1W .5 S1.ZEH GH JANTX 866 .0416 0 30 1W .5 S1.ZEH GH JANTX 866 .0416 0 30 1W .5 S1.ZEH RATILLION HOURS RAILLION HOURS RAILLION HOURS S4. TOTAL .5 .40 S1.ZEH RS JANTX 851C .82 8 35 .25 .2 .2 S1.ZEH RS JANTX 851C .82 8 35 .2 .2 .2 S1.ZEH RS JANTX 851C .82 8 35 .2 .2 .2 .2 S1.ZEH RS JANTX 851C .86 8 35 .2 .2 .2	SI.ZEN		5	JANTX	998	. 1249		30	181		
\$1.2EH GH JANTX 666 9163 9 400HJ 5 \$1.2EH GH JANTX 666 6416 9 30 400HJ 5 \$1.2EH GH JANTX 666 1666 9 30 400HJ 5 \$1.2EH GH JANTX 666 1666 9 30 400HJ 5 \$1.2EH GH JANTX 666 1666 9 30 400HJ 5 \$1.2EH GH JANTX 866 1646 9 30 400HJ 5 \$1.2EH GH JANTX 866 1646 9 30 400HJ 5 \$1.2EH GH JANTX 866 1646 9 30 400HJ 5 \$1.2EH GH JANTX 866 1846 9 40 4 \$1.2EH HS JANTX 851 85 85 85 35 35	SI.ZEN		15	JANTX	998	.4582		30	48811	5.	
\$1.2EH GH JIMITY B66 .0816 9 30 400HJ .5 51.2EH GH JAHITY B66 .086 186 9 30 1M .5 51.2EH GH JAHITY B66 .2916 0 30 400HJ .5 51.2EH GH JAHITY B66 .1666 0 30 400HJ .5 51.2EH GH JAHITY B66 .0416 0 30 400HJ .5 51.2EH GH JAHITY B66 .0416 0 30 400HJ .5 51.2EH GH JAHITY B66 .0416 0 30 400HJ .5 51.2EH HS JAH 032AG 3.557 0 40 .4 .4 51.2EH HS JAHY 051C .942 0 35 .2 .2 51.2EH HS JAHY 051C .942	N32.18		5	JANTX	990	.9163		98	400m	, v	
Strict Git JANTY USG USG GI GI UN S S S S S S S S S	S1.2FM		L 9	JOHTX	996	.8416		30	488MJ	5.	
STITEM GTI JANTX USG U	N32"15		19	JAHTX	996	. 9833		30	10	s.	
Since Gri Jant See Gri Gri	91.2FH		145	JANTX	990	9991.		30	2	50.	
\$1.2EH GH JANTX 656 .2916 0 30 400nu .5 \$1.2EH GH JANTX 866 .1666 0 30 400nu .5 \$1.2EH GH JANTX 866 .0416 0 30 400nu .5 \$1.2EH GH JANTX 866 .0416 0 30 400nu .5 \$1.2EH HS JAN 832AG 3.557 0 40 .4 .4 \$1.2EH HS JAN 832AG 3.557 0 40 .4 .4 \$1.2EH HS JANTX 651C .02 0 35 .2 .2 \$1.2EH HS JANTX 651C .02 0 35 .3 .3 .3 \$1.2EH HS JANTX 651C .02 0 35 .3 .3 .3 .3 .3 .3 .3 .3 .3	91.2EN		15	IGNTX	990	.8416		30	480MJ	5.	
Si.ZEH GH JANIX 866 9416 9 30 400PL .5	H32*15		15	SANTX	990	9162.		38	400rs	.5	
51.2EH GH JANTX 866 .0416 8 30 400HJ .5 63. TOTAL 2.6653 HILLION HOURS 8 FAILURES RATE IS 64. TOTAL 3.557 HILLION HOURS 9 FAILURES RATE IS 64. TOTAL 3.557 HILLION HOURS 9 FAILURES RATE IS 51.2EH HS JANTX 851C .82 8 35 .3 51.2EH HS JANTX 851C .82 8 35 .2 51.2EH HS JANTX 851C .82 8 35 .2 51.2EH HS JANTX 851C .81 8 35 .2 51.2EH S JANTX 851C .81 8 35 .25 .480HJ .25	N32.18		5	JANTX	990	9991		30	21	s.	
51.2EH GH JANTX 866 .0416 8 38 63. T014L 2.663 HILLION HOURS 6 FAILURES RATE IS 51.2EH HS JAN 8324G 3.557 8 48 AB .4 51.2EH HS JANTX 851C .82 8 35 .2 .2 51.2EH HS JANTX 851C .82 8 35 .2 .2 51.2EH HS JANTX 851C .82 8 35 .2 .2 51.2EH HS JANTX 851C .82 8 35 .2 .2 51.2EH HS JANTX 851C .83 8 35 .2 .2 51.2EH HS JANTX 851C .83 8 35 .2 .2 51.2EH HS JANTX 851C .83 8 35 .2 .2 51.2EH SAT JANTX 851C .83 8 35 .2 .2 51.2EH SAT JANTX 851E .838 .83 4881U.85 8 5481U.85 8 5481U.85 8 5481U.85 8 5481U.85 8 5481U.85 8 5581.2EH .25	N32.12		H9	JAHTX	990	.8416		30	400m	s.	
51.2EH HS JAN 8324G 3.557 8 48 64. TUTAL 3.557 71LL 10H HOURS 8 FAILURES RATE 1S 51.2EH HS JANTX 851C .825 8 35 51.2EH HS JANTX 851C .825 8 35 51.2EH HS JANTX 851C .826 8 35 51.2EH HS JANTX 851C .81 8 35 51.2EH HS JANTX 851C .81 8 35 65. TUTAL 1.654 71LL 10H HOURS 8 6 81LL NET THE 1S 51.2EH SAT JANTX 858E .889956 8 25 408HJ 52. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 52. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 52. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 52. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 53. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 53. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. TUTAL SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .889956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .88956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .88956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .88956 8 25 408HJ 55. ST.ZEH SAT JANTX 858E .88956 8 25 408HJ			5	JANTX	998	.0416		38			
51.2EH HS JAN 032AG 3.557 0 40 64. TOTAL 3.557 HILLION HOURS 0 FAILURES PATE IS 51.2EH HS JANTX 051C .02 0 35 51.2EH HS JANTX 051C .02 0 35 51.2EH HS JANTX 051C .02 0 35 51.2EH S JANTX 051C .01 0 35 51.2EH SAT JANTX 051C .01 0 35 51.2EH SAT JANTX 050C .010332 0 25 400HJ .25 51.2EH SAT JANTX 050C .010332 0 25 400HJ .25	ACCRECATE VALUE OF THE PARTY.	. T01AL	2.6	653 HI	1 10N H	OUPS	9 F	AILURE	S	RATE 15	8 FAIL/18**GHRS
3.557 r1LL 10H HOURS 0 FAILURES RATE 15 NS JANTX 051C .02 0 35 NS JANTX 051C .942 0 35 NS JANTX 051C .942 0 35 NS JANTX 051C .056 0 35 SAT JANTX 058E .010332 0 25 400HJ	451 S1.2EH		SH.	NAL.	032AG	3.557	0	8			
91.2EN HS JANTX 051C .02 0 35 .2 51.2EN HS JANTX 051C .02 0 35 .3 51.2EN HS JANTX 051C .02 0 35 .3 51.2EN HS JANTX 051C .01 0 35 .2 51.2EN HS JANTX 051C .01 0 75 .2 51.2EN SAT JANTX 050E .010332 0 .25 400NU .2 51.2EN SAT JANTX 050E .010332 0 .25 400NU .25 51.2EN SAT JANTX 050E .010332 0 .25 .25	3	TOTAL	3.	557 MI	L 10N H	OURS	9 F	AILURE	5	PATE 1S	8 FAIL/18**6HPS
51.2EH HS JANTX 651C .942 6 35 .3 51.2EH HS JANTX 651C .626 6 35 .2 51.2EH HS JANTX 651C .61 0 35 .2 51.2EH HS JANTX 656E .016332 0 55 400HJ 51.2EH SAT JANTX 658E .018332 0 25 400HJ .25 51.2EH SAT JANTX 658E .018332 0 25 400HJ .25	331 SI.ZEN		RS	JANTX	9510	.62		35		*	****************
SI.ZEN			115	JAHTX	9510	.942		35		.3	
S1.ZEN			HS	THHE	9510	920		35			
S1.ZEN			HS	JANTX	9510	950.		35		.2	
SI.ZEN SAT JANTX 658E .018332 0 25 400HJ .25 .3 SI.ZEN SAT JANTX 658E .036996 0 25 400HJ .25 .3 SI.ZEN SAT JANTX 658E .036996 0 25 400HJ .25 .3			NS	JANTX	9510	19.	6	35		.2	
SAT JANTX 059E .010332 0 25 400FLJ .25 SAT JANTX 059E .010332 0 25 400FLJ .3 SAT JANTX 059E .010332 0 25 400FLJ .25				854 HI	T ION H	Sano	9 5	ATLURE	5	RATE IS	
SAT JANTX 059E . 038996 0 25 SAT JANTX 059E . 018332 0 25 40011	SI.ZEN		SAT	IANTX		.010332		25	40BHJ	.25	*****
SAT JANTX 858E .018332 8 25 488MJ	N32*15 125		SAT	JANTX	BSBE	966020		52	10000	.3	
	81.ZEN		SAT	JANTX	9850	.018332	0	52	488MJ	.25	

SAT JANTA 050E .015490 0 25 400NL .25 SAT JANTA 050E .005160 0 25 400NL .25 SAT JANTA 050E .005160 0 25 400NL .25 SAT JANTA 050E .00592 0 25 400NL .25 SAT JANTA 050E .018332 0 25 400NL .25 SAT JANTA 050E .020664 0 25 400NL .25 SAT JANTA 050E .018332 0 25 400NL .25 SAT JANTA 050E .018332 0 25 400NL .25 SAT JANTA 050E .018332 0 25 400NL .25	656E .041320 0 25 40014 656E .02583 0 25 40014 670E .061932 0 25 40014 670E .061932 0 25 40014 670E .02064 0 25 40014 670E .02064 0 25 40014 670E .010332 0 25 40014 670E .010332 0 25 40014	658E .085166 0 25 40914 678E .085183 0 25 40914 678E .081833 0 25 40914 678E .029664 0 25 40914 678E .038996 0 25 40914 678E .038996 0 25 40914 678E .038996 0 25 40914	636E . 02363 0 25 4001L 636E . 061932 0 25 4001L 636E . 020664 0 25 4001L 636E . 030996 0 25 4001L 636E . 030996 0 25 4001L 636E . 030996 0 25 4001L	6.06 . 06.1992 0 25 696E . 018332 0 25 4001L 696E . 029664 0 25 4001L 656E . 038996 0 25 4001L 696E . 018332 0 25 4001L 696E . 038999 0 25 4001L	650E .010332 0 25 400HL 650E .020664 0 25 400HL 650E .010332 0 25 400HL 650E .010332 0 25 400HL 650E .010332 0 25 400HL	858E .020664 0 25 40011 858E .020664 0 25 40011 858E .010332 0 25 40011 858E .010332 0 25 40011	656E . 020664 0 25 400mu 050EE . 030996 0 25 400mu 050EE . 030995 0 25 400mu 050EE . 030996 0 25 400mu 050EE . 040mu 050EE . 0	656E .030996 0 25 400HL 636E .010332 0 25 400HL 636E .030996 0 25 400HL	050E .010332 0 25 400HJ 050E .030996 0 25 400HJ	050E .030996 0 25 400HU	PSAF . PASTICK A 24	000000000000000000000000000000000000000	. 659E . 665166 6 25 408NU	658E .010332 8 25 486MJ	656E .010332 0 25 400FL	658E .616332 6 25 466HL	050E .005166 0 25 IV	1 050E .020664 0 25 400FL	1 858E .818332 8 25 48819	23 9 192 9 23	•	7100 CZ 0 4990ZG.	6.64 6 23	14 145 A 25	858 . BEST OF CETTER . SEC.	6560 392 6 25	658A 15.143 8 25	050E .010332 0 25	. 3958		. 958E	050E .123984 0 25	959E .010332 0 25 4	858E .018332 8 25 4	958E	CZ 0 76619C 30C0	CZ 0 6850. 3000 XIMM	UN908 CZ 0 825 180, 3800	SAL SALES AND SALE AND SALES OF SALES O	The activity of the second sec	TILLIUN MUUKS O FR	SUB JAN 0518 66.332 0 352
H2:16 H2:16 H2:16 H2:16	H2:15	11.ZEH	81.2EH	N32.18		31.ZEN	81.ZEN	31.ZEN	31.ZEN	31.ZEN	31.2EN	31.2EN	91.ZEN	11.ZEN	31.ZEN	81.ZEN	31.ZEN	81.ZEN	11.ZEN	31.ZEN	31.2EN	SI.ZEN	127.18	H32-16	11.75N	31.ZEN	31.ZEN	31.2EN	51.ZEN	51.ZEN	132.18	31.ZEH	N32.18	31.2EN	31.ZEN	SI,ZEN			SI ZEN	**************	90. IUIAL 5	SI.ZEN
-	296	513 8	366 9	527 5	532 5		533 5	5 696	507 5	536 5	562 5	500	563 9	573 5	372 5	595		363 5	542 5	96		553 5	8		200	503 5	564 5	5 996	344 5	\$ 926	552 5	5111	240 5	541 5	256 5	196	554		5 215	*****	1	279 5

¥	ENTRY PART DESCRIPTION	ENV QUALITY SRCE	/ SRCE	HKS#16-6	1	HRS#18+6 FAIL TEMP RATING	SIRESS	CONTENTS
192	SI. YEN	SUB JAN	8518	2.369		2	.2	
	31:150	NOT GITS	96.10	10 953		3 4	: •	
	SILCEN			10:33		3 1		
343	SI.ZEN		9109	6.303		60	,	
187	SI.ZEN		9218	139.771		33	2.	
346	SI.ZEN	SUB JAN	9218	23.69	•	35	.5	
276	SI.ZEN	SUB JAN	9518	2305.037	92	22	.2	
286	S1.2EN	SUB JAN	9518	11.845	•	25		
278	S1.26N	SUB JAN	9518	98.822	2	35	2.	
233	ST ZEN	355	8518	692.6	•	2	2.	
	SI.ZEN	SUB JAN	9510	18.952		S.		
****	67. TOTAL	2681.71 MILLION HOURS	L 10N		29 F	FAILURES	RATE 1S	RATE IS . 010814 FAIL/10**6HRS
		**************	KALASA KA	character and	****	enterprise de la production de la prise della prise de		************************
254	SI.ZEN	SUB LOWER	6218		•	R	ž.	
255	S1.ZEN	SUB LOWER	9218	5.369		33		
256	SI.ZEN	SUB LOWER	8518	14.214		32	.2	
345	SI.ZEN	SUB LOUER	9218	7.187		33	.2	
	68. TOTAL	38.797 MILLION HOURS	T 10N	JOH HOURS	9 F	FAILURES	RATE 15	6 FAIL/10**6HRS
323	S23 S1.ZEN	SUB MIL	914	L 014 592.923	-	40 40		podrace in the following state designation of the first state of the f
-	69. TOTAL	592.923 MILLION HOURS	TION I	nevamento OURS	1 F	FAILURES	RATE 15	1 FAILURES RAIL RATE IS 168656-2 FAIL/10**6HRS
465		GF JANTX	949	TX 649 2.963	-	9	.5	GF 80%. AI 20%
-	70. TOTAL	2.983 MILLION HOURS	L 10N +	OURS	-	FAILURES	RATE 1S	FAILURES RATE 15 .33523 FAIL/10**6HRS
440	448 THYR	GB JANTXV 8578	V 8578 4.527	4.527		37	Andrewskie war	onsocialised in the second
1	71. TOTAL	4.527 MILLION HOURS	NOI T	new members DURS	9	FAILURES	RATE 15	1
8 5 8	THYR THYR		44.8	24.577 4.416 112.285	=	22 22 28	P)	
=	72. TOTAL	141.278 MILLION HOURS	L 10N +	ILL TON HOURS	12 F	FAILURES	RATE 1S	AILURES RATE IS .849389E-I FAIL/10**6HRS
136	136 THYR		855 A	4.466	0	35 . 6662A		
138	THYR		855A	1.441	13	\$5 .84A		SCR
439	THYR		855A	.72				
137	THYR		855A	15.61	9			
448		GF JANTX 855A 2.41	855 8	2.412		35 .866661A		
	73. TOTAL	24.649 MILLION HOURS	10N	IOURS	19 F	FAILURES	RATE 15	.778822 FAIL/10***GHRS
4	THYR	GF LOLER	953	9	38	55 150		

NIK	*	ENIKY PHRI DESCRIPTION	ENA	ENV MONETTY SHEE	SECE	HKSTIGTE FAIL IETT KHIING	HA	. IET	KHI IMO	SIRESS	COMENIS
4 4 4 4 5 4 5 5 5 5 5 5	THYR		ಕ್ಷಕ್ಷ	LOUER	853 853 853	~ 4 ⊕	383	55.55	15A 15A 15A		
		74. TDTAL		S7 MILLION HOURS	LION	HOURS	1 601	89 FAILURES	53	RATE 15	PAYSOLOGISTUS 1.91228 FAIL/10**6HRS
24	THYR	145 THYP 142 THYR	3 35	PLASTIC 053 5 PLASTIC 053 21	653		23	4 55 15A 23 55 15A	15A 15A		
		75. TOTAL		26 MILLION HOURS	L 10N		27	27 FAILURES	53	RATE 15	27 FAILURES RATE IS 1.83846 FAIL/18**6HPS
445	THYP	444 TH'R	611	GH JAN 054 .035	054			36	8 38 .848		8.
***		76. TOTAL		.035 MILLION HOURS	LION	HOURS		FAILURES	FAILURES		
623	THYR RVHT	523 THYR 524 THYR		GH LOUER 866 GH LOUER 866	986	GM LOWER 866 .8288 GM LOWER 866 .8312	66	36	30 1.69.186V 30 25A.688V		
		77. TOTAL		.052 MILLION HOURS	LION	HOURS		FAILURES	53	RATE 1S	FAILURES RATE IS 8 FAIL/10**GHRS
452	THYR	452 TH/R	NS	HS LOWER 832AG .181	832A	181. 5	6	40			40
		78. TOTAL		. 181 MILLION HOURS	LION	. 181 MILLION HOURS		FAILURES	53	RATE 15	8 FAILURES RATE IS 8 FAIL/10**6HPS
622	Ð	522 TUN	95	GF JAN	8228	GF JAN 8558 3.406	-	38		38	
		79. FOTAL	3.4	3.406 MILLION HOUPS	LION	3.406 MILLION HOUPS	-	FAILURES	53	RATE 1S	
488	121	488 TUN 578 TUN 579 TUN	SAT 5AT 5AT	SAT JANTX SAT JANTX SAT JANTX	658A 658E 658E	SAT JANTX 8584 1.312 SAT JANTX 858E .116649 SAT JANTX 858E .116649	000	2222		. 186	
		80. TOTAL	1.5	1.5453 MILLION HOURS	LION	1.5453 MILLION HOURS	0	FAILURES		RATE IS	
434	VAPP	434 VAP	GF	GF JAN	844n	GF JAN 844A 1.718	0	25	25	*************	VARACTOR
		81. TOTAL	1.	1.718 MILLION HOURS	LION	1.718 MILLION HOURS	0	FAILURES	53	PATE 15	FAILURES POTE IS 0 FAIL/10**6HRS
483	A des	493 VAP 493 VAP 498 VAP	SAT SAT SAT	SAT JANTX SAT JANTX SAT JANTX	8588 8588 8580	SAT JANTX 658A 19.718 SAT JANTX 658B .0336 SAT JANTX 858C .282	000	25 25 25		The state of	
	******	82. TOTAL	28.92	28.9256 MILL ION HOURS	LION	HOURS	9	FAILURES	ES	RATE 15	AILURES RATE IS 0 FAIL/10**6HRS
****	*****	******	*******	*************	*****	******	***	***	*****	*****	*************************************

APPENDIX D
FINAL DATA SUMMARY

Silicon, NPN Transistor - Data Summary

5	Survey Data - So Type and	Sorted of by m	irted and Summarized by Device by a Factor	Tame.	zed b	/ Dev	4		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
Failures	Operating 6 Hours X 10 ⁶		TA.	40	" S2	۳		LOG No.	60% λ ob	φος γ γ φορ	λ _b Predicted	Observed Predicted
0	8.594	25.0	1.5	2.0	0.3	30	1.0	18	0.1065	0.0047	0.007	0.67
*1	1.606	25.0	1.5	0.4	1.0	1.0	2.0	19			0.000	
*	0.005	0.04	1.5	0.4	0.3	1.0	1.0	20			0,007	
7	11623.7	1.0	1.5	0.2	0.3	1.0	1.0	21	0.0005	0.005	0.007	0.71
36	180.661	5.0	1.5	2.0	1.0	1.0	2.0	22	0.2114	0.0070	/ 0.007	1.0
*	5.86	5.0	1.5	0.4	1.0	1.0	1.5	23			0.007	
120	116.285	5.0	1.5	10.0	1.0	1.2	1.0	24	1.0625	0.0118	0.013	0.91
*	0.361	25.0	1.5	2.0	0.3	1.0	1.0	25			0.018	
*0	1.25	25.0	1.5	0.4	1.0	1.0	1.0	26		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	0.007	
*	0.117	25.0	1.5	0.4	0.3	1.0	1.0	27			0.007	
*	0.131	25.0	1.5	10.0	0.3	1.0	3.0	28			0.007	
0	257.709	1.0	1.5	0.4	1.0	1.0	1.0	29	0.0036	0.0059	0.007	0.84
80	3290.54	25.0	1.5	2.0	1.0	1.0	1.0	30	0.0029	0.00003	0.007	+
-	111.655	5.0	1.5	2.0	0.3	1.0	1.0	31	0.018	0.004	0.010	0.4
*0	0.061	1.0	1.5	0.4	1.0	1.2	1.0	32	\		0.005	
*0	3.018	5.0	1.5	2.0	1.0	1.0	1.0	33	\		0.010	
2	9.6	5.0	1.5	2.0	1.0	1.0	2.0	34	0.323	0.010	0.010	1.0
•	6.44	5.0	1.5	2.0	1.0	1.0	1.0	35	0.142	0.0095	0.010	0.95
*	0.153	25.0	1.5	10.0	1.5	1.0	2.5	36			0.018	
*0	7.878	1.0	1.5	0.4	1.0	1.0	2.5	37			0.005	
*	53.278	25.0	0.7	0.4	1.0	1.0	1.0	38			0.011	
*No failu	#No failure rate use cal]	mineral for this output	1	1		Tr. fre freshided				1 1 1

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **.

†This entry has been deleted from the data base.

Silicon, NPN Transistor - Data Summary (continued)

S.	Survey Data - Sorted Type and by m		and Summarized by Device Factor	mari	red by	Devi	8		ummarized by Device Calculated from	ed from Data	Predicted by Applications	Variance Ratio
Failures	Operating 6 Hours X 10 ⁶	TE	"A	۳٥.	72	J _m C	"R	LOG No.	60% λ ob	φος γ γ pop	λ _b Predicted	Observed Predicted
*0	0.017	0.04	0.7	4.0	1.0	1.0	1.0	39			0.007	
0	6071.57	1.0	0.7	2.0	1.0	1.0	1.0	07	0.00015	0.001	0.007	+
1060	11271.3	5.0	0.7	2.0	1.0	1.0	2.0	41	0.0948	0.0067	0.010	0.67
3	214.862	5.0	0.7	0.4	1.0	1.0	1.1	42	0.0194	0.0126	0.011	1.1
*	3.564	5.0	0.7	0.2	1.0	1.0	1.0	43			0.007	
0	4.673	25.0	0.7	2.0	1.0	1.0	1.0	777	0.1958	0.0056	0.018	0.31
*	8.205	25.0	0.7	0.4	1.0	1.0	1.0	45			0.010	
*	8.126	25.0	0.7	10.0	1.0	1.0	1.0	97			0.018	
*0	0.77	25.0	0.7	0.4	1.0	1.0	1.0	47			900.0	
*	31.032	1.0	0.7	0.4	1.0	1.0	1.0	84			0.005	
16	3901.74	25.0	0.7	2.0	1.0	1.0	1.0	64	0.0045	0.0001	900.0	+
*0	9.476	25.0	0.7	0.4	1.0	1.0	1.0	20			900.0	
*	106.605	25.0	0.7	10.0	1.0	1.0	1.0	51	0.0036	0.00005	900.0	+
*	0.092	25.0	1.0	0.4	1.0	1.0	1.0	52			900.0	
*0	8.388	0.04	1.0	0.2	1.0	1.0	1.0	53			0.00	
8	7.546	1.0	1.0	0.2	1.0	1.0	1.0	54		3	0.017	
1771	1893.75	5.0	1.0	10.0	1.0	1.0	2.5	55	0.9412	0.0075	0.008	0.94
1713	3151.0	5.0	1.0	20.0	1.0	1.0	1.0	99	0.5472	0.0055	0.013	0.42
*	0.195	25.0	1.0	10.0	1.0	1.0	1.0	57			0.018	
*1	318.456	1.0	1.0	0.4	1.0	1.0	1.0	88			900.0	

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **.

Silicon, NPN Transistor - Data Summary (continued)

Variance Ratio	Observed Predicted	+	1.0		0.68										
Predicted by Applications	λ _b Predicted	0.007	0.007		67 (168 cm)	2000	3			8.00.8	5095.0	NAME OF TAXABLE PARTY.			
ed from Data	60% λ bob	0.0003	0.007							0.300.50		2			
Calculated from Survey Data	60% λ ob	0.0137	0.020				5 mg 100 mg			Contract of		1000	2000年の日本		
	LOG No	59													
8	# R	1.0	1.0								014				
y Dev	π ^c	1.0	1.0					12 16							
zed by	* S2	1.0	1.0						1		2 .				
Tra .	"	2.0	0.58				,		100						
and Summarized by Device Factor	A.	1.0	0.85 0.58			1			15						
rted by =	پ و	25.0	5.8			60									
Survey Data - So Type and	Operating Hours X 10 ⁶	2785.88	469.58	TOTALS	29318.0			*	KOT &				Control of the second		
PS.	Failures	96	8**	-0 <u>T</u>	4754										

**Composite calculation.
†This entry has been deleted from the data base.

Silicon, PNP Transistor - Data Summary

TE TA TQ TSZ TC TR LOG NO. 25.0 1.0 2.0 1 1.0 1.0 70 5.0 1.5 2.0 1 1.0 1.0 70 5.0 1.5 2.0 1 1.0 1.0 71 5.0 1.5 2.0 1 1.0 1.0 71 5.0 1.5 0.4 1 1.0 1.0 73 6.0 1.5 0.4 1 1.0 1.0 73 5.0 1.5 0.4 1 1.0 1.0 73 5.0 1.5 0.4 1 1.0 1.0 73 5.0 1.5 0.4 1 1.0 1.0 73 5.0 1.5 1.0 1 1.0 1.0 73 5.0 1.5 1.0 1 1.0 1.0 1.0 1.0 5.0 1.5	J.	Survey Data - So Type and	by a	and Summarized by Device Factor	- Land	zed b	y Devi	8		Calculated from Survey pata	ed from Data	Predicted by Applications	Variance Ratio
4,564 25.0 1.0 1.0 1.0 0.200 0.004 0.011 3,839 5.0 1.5 2.0 1 1.0 1.0 7.1 0.005 0.005 0,149 25.0 1.5 0.4 1 1.0 1.0 7.2 0.003 0.013 0,001 40.0 1.5 0.4 1 1.0 1.0 7.4 0.0008 0.003 0.013 27.126 5.0 1.5 0.4 1 1.0 1.0 7.4 0.0008 0.003 0.013 27.126 5.0 1.5 0.4 1 1.0 1.0 7.4 0.0008 0.003 0.013 9.1 5.0 1.5 0.4 1 1.0 1.0 1.0 1.0 1.0 1.0 0.013 0.91 5.0 1.5 0.4 1 1.0 1.0 1.0 1.0 1.0 0.013 0.92 1.5 0.4		Operating 6 Hours X 10 ⁶	3,,	A.		*52		"R	LOG NO.	40 x	φος γ γ pop	λ _b Predicted	Observed Predicted
3.839 5.0 1.5 1.0 1.0 71 0.015 0.149 25.0 1.5 0.4 1 1.0 1.5 72 0.001 40.0 1.5 0.4 1 1.0 1.0 73 0.003 0.019 3743.24 1.0 1.5 0.4 1 1.0 1.0 74 0.0008 0.003 0.011 27.126 5.0 1.5 0.4 1 1.0 1.0 75 0.003 0.0145 0.011 0.901 5.0 1.5 0.4 1 1.0 1.5 0.015 0.013 0.013 0.901 5.0 1.5 0.4 1 1.0 1.5 0.015 0.013 0.013 0.91 5.0 1.5 0.4 1 1.0 1.0 3.0 3.0 0.013 0.013 0.94 5.0 1.5 0.4 1 1.0 1.0 3.0 3.0 0.012 <td>0</td> <td>4.564</td> <td>25.0</td> <td>1.0</td> <td>2.0</td> <td>1</td> <td>1.0</td> <td>1.0</td> <td>70</td> <td>0.200</td> <td>0.004</td> <td>0.011</td> <td>0.36</td>	0	4.564	25.0	1.0	2.0	1	1.0	1.0	70	0.200	0.004	0.011	0.36
0.149 25.0 1.5 0.4 1 1.0 1.5 72 0.0008 0.0019 0.0110 3743.24 1.0 1.5 0.4 1 1.0 1.0 73 0.0008 0.0016 0.0110 27.126 5.0 1.5 0.2 1 1.0 1.0 7.5 0.0053 0.0115 0.0115 0.901 5.0 1.5 0.4 1 1.0 1.0 0.053 0.0165 0.013 9.1 5.0 1.5 1.0 1 1.0 1.0 0.053 0.0165 0.013 9.1 5.0 1.5 1.0 1 1.0 1.0 0.012 0.013 0.013 0.341 5.0 1.5 1.0 1 1.0 5.0 1 1.0 5.0 1 1.0 5.0 1 0.033 0.013 0.013 0.013 0.013 0.013 0.013 0.013 0.011 0.013 0.011	*1	3.839	5.0	1.5	2.0	1	1.0	1.0	п			0.015	
0.001 40.0 1.5 0.4 1. 1.0 1.0 73 0.0008 0.0003 0.0110 3743.24 1.0 1.5 0.1 1.0 1.0 74 0.0008 0.0033 0.0115 27.126 5.0 1.5 2.0 1 1.0 1.0 75 0.0533 0.0145 0.0135 0.901 5.0 1.5 0.4 1 1.0 1.5 0.0 0.0135 9.1 5.0 1.5 0.4 1 1.0 1.5 0.0 0.0135 0.0135 0.306 25.0 1.5 0.4 1 1.0 1.0 7 0.923 0.012 0.013 0.417 25.0 1.5 0.4 1 1.0 1.0 3.0 3.0 0.013 0.013 0.418 25.0 1.5 0.4 1 1.0 8.0 8.0 0.010 0.010 0.406 1.0 1.2 0.4	*	0.149	25.0	1.5	4.0	-	1.0	1.5	72			0.019	
3743.24 1.0 1.5 0.2 1 1.0 1.0 74 0.0008 0.003 0.0113 27.126 5.0 1.5 2.0 1 1.0 3.0 75 0.653 0.0145 0.013 9.1 5.0 1.5 0.4 1 1.0 1.5 76 0.013 0.013 0.306 5.0 1.5 10.0 1 1.2 1.5 77 0.923 0.012 0.013 0.306 25.0 1.5 10.0 1 1.0 1.0 78 0.012 0.012 0.013 0.417 25.0 1.5 10.0 1 1.0 5.0 89 0.003 0.0019 0.010 0.127 25.0 1.5 1.0 1 1.0 89 0.003 0.0009 0.010 0.406 1.0 1.5 1.0 1 1.0 89 0.003 0.0009 0.010 1.0 1.0	*	0.001	40.0	1.5	4.0	-	1.0	1.0	73			0.010	
27.126 5.0 1.5 1.0 1.0 3.0 75 0.653 0.0145 0.013 0.901 5.0 1.5 0.4 1 1.0 1.5 76 0.013 0.013 9.1 5.0 1.5 1.0 1.1 1.0 1.5 77 0.923 0.0142 0.013 0.306 25.0 1.5 1.0 1.1 1.0 78 77 0.923 0.012 0.013 0.417 25.0 1.5 1.0 1.0 1.0 78 78 0.012 0.023 0.146 25.0 1.5 1.0 1.0 1.0 2.0 80 2.0 0.010 0.045 25.0 1.5 1.0 1.0 2.0 81 2.0 0.000 0.010 0.406 1.0 1.5 1.0 2.0 82 2.0 0.000 0.010 2.05 2.0 1.1 2.0 81 2.0 <th< td=""><td>2</td><td>3743.24</td><td></td><td>1.5</td><td>0.2</td><td>-</td><td>1.0</td><td>1.0</td><td>74</td><td>0.0008</td><td>0,003</td><td>0.011</td><td>0.27</td></th<>	2	3743.24		1.5	0.2	-	1.0	1.0	74	0.0008	0,003	0.011	0.27
0.901 5.0 1.5 0.4 1 1.0 1.5 76 0.923 0.012 0.013 9.1 5.0 1.5 10.0 1 1.2 1.5 77 0.923 0.012 0.021 0.346 25.0 1.5 2.0 1 1.0 1.0 79 70 0.012 0.023 0.417 25.0 1.5 1.0 1 1.0 80 70 0.013 0.146 25.0 1.5 1.0 1 2.0 81 70 0.013 0.045 25.0 1.5 1.0 1 2.0 82 70 0.010 0.466 1.0 1.5 2.0 1 2.0 83 0.000 0.010 2.055 2.0 1.5 2.0 1 1.0 84 0.003 0.000 0.010 2.056 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0	16	27.126		1.5	2.0	-	1.0	3.0	75	0.653	0.0145	0.015	0.97
9.1 5.0 1.5 10.0 1 1.2 1.5 77 0.923 0.012 0.030 0.306 25.0 1.5 2.0 1 1.0 1.0 78 0.033 0.030 0.417 25.0 1.5 0.4 1 1.0 5.0 89 0.033 0.019 0.127 25.0 1.5 0.4 1 2.0 81 0.010 0.010 0.046 1.0 1.5 0.4 1 2.0 82 0.010 0.010 0.466 1.0 1.5 0.4 1 2.0 82 0.001 0.010 0.466 1.0 1.5 0.4 1 1.0 83 0.000 0.010 26.059 25.0 1.5 2.0 1 1.0 86 0.003 0.000 0.010 12.0 1.0 1.0 1.0 88 0.002 0.000 0.001 409.837 25.0 <th< td=""><td>*</td><td>0.901</td><td></td><td>1.5</td><td>4.0</td><td>1</td><td>1.0</td><td>1.5</td><td>9/</td><td></td><td></td><td>0.013</td><td></td></th<>	*	0.901		1.5	4.0	1	1.0	1.5	9/			0.013	
0.306 25.0 1.5 2.0 1 1.0 1.0 78 9	1	9.1			10.0	-	1.2	1.5	11	0.923	0.012	0.021	0.58
0.417 25.0 1.5 0.4 1 1.0 5.0 79 0.025 0.146 25.0 1.5 10.0 1 1.0 80 0.019 0.127 25.0 1.5 0.4 1 2.0 81 0.010 0.045 25.0 1.5 0.4 1 2.0 82 0.010 0.406 1.0 1.5 0.4 1 1.0 83 0.0003 0.000 300.863 25.0 1.5 2.0 1 1.0 84 0.003 0.0000 0.010 26.059 25.0 1.5 2.0 1 1.0 85 0.035 0.0005 0.010 12.07 5.0 1.5 2.0 1 1.0 86 0.075 0.0005 0.010 409.837 25.0 1.5 2.0 1 1.0 88 0.002 0.0003 0.005 2.902 5.0 1.5 2.0 <th< td=""><td>*</td><td>0.306</td><td></td><td>1.5</td><td>2.0</td><td>-</td><td>1.0</td><td>1.0</td><td>78</td><td></td><td></td><td>0.030</td><td></td></th<>	*	0.306		1.5	2.0	-	1.0	1.0	78			0.030	
0.146 25.0 1.5 1.0 80 90 90.019 90.019 0.127 25.0 1.5 0.4 1 2.0 81 0.010 0.010 0.406 1.0 1.5 0.4 1 1.0 83 0.000 0.010 300.863 25.0 1.5 1.0 1.0 84 0.003 0.0004 0.010 26.059 25.0 1.5 1.0 85 0.035 0.0009 0.010 12.07 5.0 1.5 1.0 85 0.035 0.005 0.015 409.837 25.0 1.5 1.0 87 0.005 0.005 0.005 409.837 25.0 1.5 2.0 1.0 88 0.002 0.009 2.486 25.0 1.5 1.0 1.0 89 0.011 0.017	*	0.417		1.5		1	1.0	5.0	79			0.025	
0.127 25.0 1.5 0.4 1 2.0 81 0.010 0.010 0.045 25.0 1.5 1.0 5.0 82 0.010 0.010 0.406 1.0 1.5 0.4 1 1.0 83 0.0009 0.0008 300.863 25.0 1.5 2.0 1 1.0 84 0.003 0.00009 0.010 26.059 25.0 1.5 2.0 1 1.0 85 0.035 0.0009 0.010 12.07 5.0 1.5 2.0 1 1.0 86 0.075 0.005 0.015 409.837 25.0 1.5 2.0 1 1.2 1.0 88 0.005 0.006 2.902 5.0 1.5 2.0 1 1.0 89 0.011 0.011 0.011	5	0.146		1.5	10.0	1		1.0	80			0.019	
0.045 25.0 1.5 10.0 1 5.0 82 0.003 0.0008 0.406 1.0 1.0 83 0.003 0.0008 0.008 300.863 25.0 1.5 2.0 1 1.0 84 0.003 0.00004 0.010 26.059 25.0 1.5 2.0 1 1.0 85 0.035 0.0009 0.010 12.07 5.0 1.5 2.0 1 1.2 1.0 86 0.075 0.005 0.015 409.837 25.0 1.5 2.0 1 1.2 1.0 88 0.002 0.0003 0.006 2.902 5.0 1.5 2.0 1 1.0 89 0.011 0.001 0.001 2.486 25.0 0.7 0.4 1 1.0 90 0.315 0.011 0.017	8	0.127		1.5	4.0	-		2.0	81			0.010	
1.0 1.5 0.4 1 1.0 83 0.0003 0.0008 0.000 25.0 1.5 1.0 84 0.003 0.0000 0.010 25.0 1.5 1.0 85 0.035 0.0005 0.015 1.0 1.5 1.0 86 0.075 0.005 0.015 25.0 1.5 1.0 1.0 88 0.000 0.000 25.0 1.5 2.0 88 0.0003 0.001 0.015 25.0 0.7 0.4 1. 1.0 89 0.315 0.011 0.015	*	0.045		1.5	10.0	1		5.0	82			0.010	
25.0 1.5 2.0 1 1.0 84 0.003 0.00004 0.010 25.0 1.5 1.0 85 0.035 0.0009 0.010 5.0 1.5 2.0 1 1.0 86 0.075 0.005 0.015 1.0 1.5 1.0 87 0.006 0.006 25.0 1.5 2.0 88 0.002 0.0003 0.009 5.0 1.5 2.0 89 0.315 0.011 0.015 25.0 0.7 0.4 1 1.0 89 0.315 0.011 0.017	*	0.406		1.5	4.0	1		1.0	83			0.008	
25.0 1.5 10.0 1 1.0 85 0.035 0.00009 0.010 5.0 1.5 2.0 1 1.0 86 0.075 0.005 0.015 25.0 1.5 2.0 1 1.2 1.0 88 0.002 0.0003 0.009 5.0 1.5 2.0 1 2.0 89 0.315 0.011 0.015 25.0 0.7 0.4 1 1.0 89 0.315 0.011 0.015	•	300.863		1.5	2.0	1		1.0	84	0.003	0.00004	0.010	+
5.0 1.5 2.0 1 1.0 86 0.075 0.005 0.015 1.0 1.5 1.0 87 0.006 0.006 25.0 1.5 2.0 1 1.0 88 0.002 0.0003 0.009 5.0 1.5 2.0 1 2.0 89 0.315 0.011 0.015 25.0 0.7 0.4 1 1.0 90 0.315 0.011 0.017	•	26.059		1.5	10.0	1		1.0	85	0.035	0.00009	0.010	+
1.0 1.5 0.4 1 1.2 1.0 87 0.0002 0.0003 0.0009 25.0 1.5 2.0 1 2.0 89 0.315 0.011 0.015 25.0 0.7 0.4 1 1.0 90 0.315 0.017 0.017	0	12.07		1.5	2.0	1		1.0	98	0.075	0.005	0.015	0.33
25.0 1.5 2.0 1 1.0 88 0.0002 0.0003 0.009 5.0 1.5 2.0 1 2.0 89 0.315 0.011 0.015 25.0 0.7 0.4 1 1.0 90 0.017 0.017	*	0.061	1.0	1.5	4.0	1	1.2	1.0	87			900.0	
5.0 1.5 2.0 1 2.0 89 0.315 0.011 6.015 1 25.0 0.7 0.4 1 1.0 90 0.315 0.017 0.017 0.017	0	409.837	25.0	1.5	2.0	1		1.0	88	0.002	0.0003	0.00	+
25.0 0.7 0.4 1 1.0 90	•	2.902	5.0	1.5	2.0	1		2.0	68	0.315	0.011	0.015	0.73
	Š	2.486	25.0	0.7	7.0	1	1.0		8			0.017	Sales Application in

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **. This entry has been deleted from the data base.

Silicon, PNP Transistor - Data Summary (continued)

TO SERVICE OF	Surves Data - Sorted Type and by m		Factor	Tal.	zed D	and Summarized by Device Factor	e e		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
Fatlures	Operating 6 Hours X 10 ⁶	TE.	*A	40	*S2	ٿر ت	# R	LOG NO.	60% λ ob	60% λ bob	λ _b Predicted	Observed Predicted
*0	0.539	0.04	0.7	4.0	1	1.0	1.5	91			0.010	
2	2973.1	1.0	0.7	0.2	1	1.0	1.0	92	0.001	0.007	0.011	79.0
31.7	5254.4	5.0	0.7	2.0	-	1.0	1.0	93	0.061	0.0088	0.015	0.59
8	11.094	5.0	0.7	0.4	-	1.0	1.0	76			0.012	
8	0.285	5.0	0.7	0.5	1	1.0	1.0	95			0.010	
0	5.825	25.0	0.7	2.0	-	1.0	1.0	96	0.157	0.005	0.022	0.23
*	1.416	25.0	0.7	0.4	-	1.0	1.0	97			0.010	
*	0.122	25.0	0.7	10.0	-	1.0	1.0	86		15.00	0.030	
\$	0.468	25.0	0.7	0.4	-	1.0	1.0	66			0.009	
0	107.641	1.0	0.7	7.0	1	1.0	2.0	100	0.0085	0.015	0.021	0.72
18	1454.57	25.0	0.7	2.0	1	1.0	1.0	101	0.0136	0.0004	0.009	÷
0	35.535	25.0	0.7	10.01	1	1.0	1.0	102	0.0257	0.00015	0.010	+
*	9.205	5.0	0.7	2.0	-	1.0	1.0	103			0.015	
*	0.099	25.0	0.7	0.4	1	1.0	1.0	104	10 TO Sept.		0.010	
*	3.78	0.04	0.7	4.0	-	1.0	1.0	105		6274	0.015	
*	125.372	1.0	0.7	0.2	-	1.0	1.0	106			0.011	
978	1140.42	5.0	1.0	10.0	1	1.0	1.5	107	0.8652	0.011	0.013	0.85
1103	1936.0	5.0	1.0	20.0	1	1.0	1.0	108	0.5745	900.0	0.021	0.29
0	388.89	1.0	1.0	4.0	1	1.0	1.0	109	0.002	0.005	900.0	0.83
13	1374.84	25.0	1.0	2.0	1	1.0	1.5	110	0.0106	0.0001	0.010	+
1 に対するける。							100					

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **. This entry has been deleted from the data base.

Silicon, PNP Transistor - Data Summary (continued)

**Composite calculation.
†This entry has been deleted from the data base.

Germanium Translators - Data Summary

•	Survey Data - Type an	Sorted d by .	and Summarized by Device Factor	1	zed b) Dev	8		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
Failures	Operating 6 Hours X 10 ⁶	۳	*	40	1 32	ړ ۲	"R	LOG No.	60% 3 ob	φο ς γ	λ _b Predicted	Observed Predicted
0	0.059	25.0	1.0	2.0	1	1	1.0	1.5				
•	4.051	5.0	0.7	2.0	7	1	1.5	16	1.814	0.172	0.075	2.3
9	1632.22	25.0	0.7	2.0	1	-	1.0	17	0.0045	0.00013	0.023	•
•	0.234	25.0	1.0	2.0	1	-	1.0	09			0.012	
0	7.998	5.0	1.5	2.0	-	-	1.5	19	0.1144	0.005	0.00	0.56
0	0.013	1.0	1.5	0.4	-	-	2.5	62			900.0	
0	393.254	25.0	1.5	2.0	-	7	1.1	63	0.0023	0.00003	0.010	+
0	7.681	5.0	0.7	2.0	1	-	1.5	99	0.119	0.011	0.011	1.0
0	0.095	5.0	0.7	4.0	1	1	5.0	65			0.007	
•	0.200	25.0	0.7	2.0	1	-	5.0	99			0.031	
0	0.612	25.0	0.7 10.0	10.0	1	1	5.0	19			0.031	
0	0.039	25.0	0.7	0.4	1	-	5.0	89			600.0	
01	416.944	25.0	0.7	2.0	1	1	5.0	69	0.0276	0.00016	0.00	+
			-									
	0,40000	411	•					Tre 2016				
											4.00.0	0.0
	Part of the part o									100		No.
		100										
									The second second		THE PART OF THE PA	

+This entry has been deleted from the data base.

Field Effect Transistors - Data Summary

Pailures Operating Text Text	3	Survey Data - Sorted Type and by #	orted by T	and S	and Summarized by Device Factor	zed b	/ Dev	9		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
2.264 1.0 1 0.2 - 1.0 - 1.0044 0.044 364.0 5.0 1 10.0 - 1.0 - 2 1.238 0.0247 0.036 231.0 5.0 1 20.0 - 1.0 - 3 1.6349 0.0164 0.036 4.021 25.0 1 20.0 - 1.0 - 4 0.036 0.0164 0.036 630.2 1.019 2.0 1 1.0 - 4 0.036 0.011 0.032 45.978 25.0 1.5 2.0 1.0 - 6 0.0065 0.011 0.021 45.978 5.0 1.1 0.0 - 1.0 - 7 0.137 0.0027 0.013 45.978 5.0 1.1 0.0 - 1.0 - 9 0.137 0.0027 0.013 5.0 1.1 1.0 - <	Failures	Operating Hours X 10 ⁶	And the second	"A	70	*52	[∓] c	"R	L0G No.	60% A ob	60% 3 bob	λ _b Predicted	Observed Predicted
364.0 5.0 1 10.0 - 1.0 2 1.2338 0.0247 0.036	*0	2.264	1.0	1	0.2	1	1.0	•	1			0.044	
# 0.021 25.0 1 10.0 = 1.0 - 3 1.6349 0.0164 0.036 # 1.019 25.0 1 10.0 = 1.0 - 4 # 1.019 25.0 1 20.0 - 1.0 - 4 # 1.019 25.0 1 20.0 - 1.0 - 5 # 2.8.99 5.0 1 1 20.0 - 1.0 - 6 # 0.042 25.0 1 2.0 - 1.0 - 7 # 0.042 25.0 1 2.0 - 1.0 - 9 # 0.042 25.0 1 2.0 - 1.0 - 9 # 0.042 25.0 1 2.0 - 1.0 - 10 # 0.042 25.0 1 2.0 - 1.0 - 10 # 0.042 25.0 1 2.0 - 1.0 - 10 # 0.042 25.0 1 0.0 - 1.0 - 10 # 0.042 25.0 1 0.0 - 1.0 - 10 # 0.042 25.0 1 0.0 - 1.0 - 10 # 0.042 25.0 1 0.0 - 1.0 - 10 # 0.045 1.0 1 0.4 - 1.0 - 12 # 0.056 1.0 1 0.4 - 1.0 - 12 ## 6.39 6.8 1 4.2 - 1.0 - 14 TOTALS *** ** ** ** ** ** ** ** ** ** ** **	443	364.0	5.0	1	10.0	1	1.0	,	2	1.2338	0.0247	0.036	69.0
0.021 25.0 1 10.0 = 1.0 - 4 1.019 25.0 1 20.0 - 1.0 - 5 630.2 1.01 1 20.0 - 1.0 - 5 45.978 25.0 1.0 1 0.4 - 1.0 - 6 0.00663 0.011 0.021 28.99 5.0 1.1 0.4 - 1.0 - 6 0.00663 0.011 0.015 28.99 5.0 1.1 0.0 1.0 - 7 0.137 0.0027 0.015 2.64 5.0 1.1 1.0 - 1.0 - 9 0.0227 0.015 0.021 2.50 1.1 1.0 - 1.0 - 1.1 0.0027 0.012 0.022 1.0 1.0 1.0 - 1.1 0.0 0.012 0.023 1.0 1.0	372	231.0	5.0	1	20.0	1	1.0	•	3	1.6349	0.0164	0.036	0.45
1.019 25.0 1 20.0 - 1.0 - 5 0.00663 0.011 0.015 45.978 25.0 1.5 2.0 - 1.0 - 6 0.00663 0.011 0.015 28.99 5.0 1.5 2.0 - 1.0 - 8 0.326 0.0057 0.019 28.99 5.0 1 10.0 - 1.0 - 8 0.326 0.0065 0.017 2.64 5.0 1 2.0 - 1.0 - 9 0.326 0.0057 0.019 0.042 25.0 1 2.0 - 1.0 - 10 0 0.020 0.042 25.0 1 10.0 - 1.0 - 11 0 0.012 0.045 1.0 1 0.4 - 1.0 - 12 0 0.012 0.055 1.0 1 0.4 - 1.2 - 13 0.0486 0.017 0.012 1306.6 1 4.2 1 1.0 - 1.0 - 14 0.486 0.017 0.027 1306.6 1 1 1 1 1 1 1 1 1	*	0.021	25.0	1	10.0	16	1.0	,	4			0.052	
630.2 1.0 1 0.4 - 1.0 - 6 0.00663 0.011 0.015 45.978 25.0 1.5 2.0 - 1.0 - 7 0.137 0.0027 0.019 28.99 5.0 1 10.0 - 1.0 - 8 0.137 0.0027 0.019 4 2.64 5.0 1 2.0 - 1.0 - 9 0.326 0.0017 9 0.021 25.0 1 2.0 - 1.0 - 9 0.020 0.017 9 0.021 25.0 1 10.0 - 10 - 11 - 11 0.019 10.050 1.0 1 0.4 - 1.0 - 12 12 - 12 0.012 10.055 1.0 1 0.4 - 1.0 - 12 - 14 - 14	*	1.019	25.0	1	20.0		1.0	,	2			0.021	
45.978 25.0 1.5 2.0 - 1.0 - 7 0.137 0.0027 0.019 28.99 5.0 1 10.0 - 1.0 - 8 0.326 0.0065 0.017 2.64 5.0 1 2.0 - 1.0 - 9 0.326 0.0065 0.017 2.64 5.0 1 2.0 - 1.0 - 9 0.326 0.0065 0.017 2.64 5.0 1 10.0 - 1.0 - 10 0.0021 2.0021 25.0 1 10.0 - 1.0 - 110 2.0022 1.0 1 0.4 - 1.2 - 13 2.0025 1.0 1 0.4 - 1.2 - 13 2.0025 1.0 1 4.2 - 1.0 - 14 2.0026 2.30 2.30 2.30 2.30 2.30 2.30 2.30 2.30	3	630.2	1.0	1	9.0		1.0	,	9	0.00663	0.011	0.015	0.73
28.99 5.0 1 10.0 - 1.0 - 8 0.326 0.0065 0.017 2.64 5.0 1 2.0 - 1.0 - 9 0.042 25.0 1 2.0 - 1.0 - 10 0.021 25.0 1 10.0 - 1.0 - 10 0.021 25.0 1 10.0 - 1.0 - 10 0.037 1.0 1 0.2 - 1.0 - 12 0.025 1.0 1 0.4 - 1.2 - 13 0.025 1.0 1 0.4 - 1.2 - 14 1306.6	2	45.978	25.0	1.5	2.0	,	1.0		7	0.137	0.0027	0.019	0.14
2.64 5.0 1 2.0 - 1.0 - 9 0.020 9.0042 25.0 1 2.0 - 1.0 - 10 0.0021 25.0 1 10.0 - 1.0 - 10 0.037 1.0 1 0.2 - 1.0 - 12 0.030 1.0 1 0.4 - 1.2 - 13 0.025 1.0 1 0.4 - 1.2 - 13 0.012 1306.6 1306.6 9 0.002 0.003 0.002 0.002 0.002 0.002 0.002 0.002 0.002 0.002 0.002 0.002	*	28.99	5.0	1	10.0		1.0	,	&	0.326	0.0065	0.017	0.38
# 0.042 25.0 1 2.0 - 1.0 - 10 0.019 0.021 25.0 1 10.0 - 1.0 - 11 0.307 1.0 1 0.2 - 1.0 - 12 0.050 1.0 1 0.4 - 1.2 - 13 0.025 1.0 1 0.4 - 1.2 - 14 6.39 6.8 1 4.2 - 1.0 - 14 TOTALS 1306.6	8	2.64	5.0	1	2.0	,	1.0	,	6			0.020	
# 0.021 25.0 1 10.0 - 1.0 - 11	8	0.042	25.0	1	2.0	•	1.0	,	10			0.019	
# 0.307 1.0 1 0.2 - 1.0 - 12	*	0.021	25.0	1	10.01	1	1.0	,	H			0.019	
# 0.050 1.0 1 0.4 - 1.2 - 13 0.012 # 0.025 1.0 1 0.4 - 1.0 - 14 0.012 ## 6.39 6.8 1 4.2 - 1.0 - 14 0.486 0.017 0.027 TOTALS 1306.6	8	0.307	1.0	1	0.2		1.0	,	12			0.012	
## 6.39 6.8 1 4.2 - 1.0 - 14 0.486 0.017 0.012 TOTALS 1306.6	5	0.050	1.0	-	9.0	1	1.2	,	13			0.012	
** 6.39 6.8 1 4.2 - 1.0 - 0.486 0.017 0.027 TOTALS 1306.6	8	0.025	1.0	1	9.0	•	1.0	1	14			0.012	
1306.6	*.	6.39	8.9	-	4.2	1	1.0	,		0.486	0.017	0.027	0.63
1306.6		OTALS											
	833	1306.6							200			200	0.64
			90						SILS	0	September 19	0.00	# 4
												\$ 100 to	
										B 10	0.000		Contract Contract

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **.

Unijunction Translator - Data Summary

2	Survey Data - S Type and	- Sorted	Facto	and Summarized by Device Factor	zed b) Dev	8		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
4 4	Operating 6 Hours X 10 ⁶	J.	"A	4 0	1 52	πc	# #	LOG No.	60% λ ob	60% 3 bob	λ _b Predicted	Observed Predicted
F 12	0.149	25.0	-	1.6	-	1	-	1111			0,040	
	19.287	5.0	•	8.0	•	•	1	112	0.2722	0.0068	0.020	0.34
	0.597	5.0	1	1.6	•	1	•	113			0.040	26,49
	0.031	25.0	'	40.0	•	•	•	114			0.020	
	0.051	25.0	•	8.0	•	•	•	115			0.022	
	1.725	5.0	•	1.6	'	•	1	116			0.010	
	2.553	6.8	'	2.2	1	•	•		0.359	0.024	0.019	•
											1000	
											0.849	
				S 2				0			1870100	
											100000	
									STEEL BOOK	0.0000	100	
										10 00 m	0.00	
									Constitution of	# 125.a	0.083	
				0				a.	1		0.007	
											N80.0	
						0,1		in the	· · · · · · · · · · · · · · · · · · ·		0.600	0 0
		CD.						er,	3,000		18 TO 18	70.49
											0.0.0	
											THE PERSON OF PERSON	
												一 在 的 不 人 一 人 人 人 人

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **. This entry has been deleted from the data base.

Silicon Diodes - Data Summary

S Operating Fig. TA TQ TSZ TC TR LOG NO. A Obb A O	Ā	Survey Data - Sor Type and b	y ted	and Summarized by Device Factor	in a ri	zed by	, Dev	90		Calculated from Survey Data	ed from	Predicted by Applications	Variance Ratio
1.9 1.0 1.0 1.0 0.7 1 - 13 0.2938 25.0 1.5 1.0 0.7 1 2.0 14 0.0007 40.0 1.5 1.0 0.7 1 2.0 15 12.073 1.0 1.5 0.5 0.7 1 2.0 16 205.505 5.0 1.5 5.0 0.7 1 1.5 17 0.08126 2673.87 5.0 1.5 1.0 0.7 1 1.5 18 0.00236 1.752 25.0 1.5 25.0 0.7 1 2.0 19 0.06158 1.752 25.0 1.5 25.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 0.021 25.0 1.5 25.0 0.7 1 4.0 22 0.007 25.0 1.5 1.0 0.7 1 4.0 22 45.426 1.0 1.5 1.0 0.7 1 4.0 22 0.007 25.0 1.5 1.0 0.7 1 1.5 25 0.255 5.0 1.5 1.0 0.7 1 1.5 25 0.256 1.0 1.5 1.0 0.7 1 1.5 25 0.257 1.5 1.0 0.7 1 1.5 25 0.258 25.0 1.5 1.0 0.7 1 1.5 25 0.259 25.0 1.5 1.0 0.7 1 1.0 30 0.299 25.0 1.0 1.0 0.7 1 1.0 32 0.299 25.0 1.0 1.0 0.7 1 1.0 32 0.299 25.0 1.0 1.0 0.7 1 1.0 32 0.299 25.0 1.0 1.0 0.7 1 1.0 32 0.299 25.0 1.0 1.0 0.7 1 1.0 32 0.299 25.0 1.0 1.0 0.7 1 1.0 32 0.299 25.0 1.0 1.0 0.7 1 1.0 32	Failures	Operating 6 Hours X 10 ⁶		Y.	70	1 52	T _C	*	L0G No.	60% A ob	60% λ bob	λ _b Predicted	<u>Observed</u> Predicted
0.2938 25.0 1.5 1.0 0.7 1 2.0 14 0.0007 40.0 1.5 1.0 0.7 1 2.0 15 12.073 1.0 1.5 1.0 0.7 1 4.0 16 205.505 5.0 1.5 5.0 0.7 1 1.5 18 0.00236 2673.87 5.0 1.5 1.0 0.7 1 1.5 18 0.00236 1956.6 5.0 1.5 25.0 0.7 1 2.0 19 0.00236 1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.55226 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.55226 2.249 25.0 1.5 5.0 0.7 1 4.0 20 0.55226 2.249 1.5 1.0 0.7 1 4.0 20 0.55226 1.5	*0	1.9	1.0	1.0	1.0	0.7	1	1	13			0.0013	
0.0007 40.0 1.5 1.0 0.7 1 2.0 15 12.073 1.0 1.5 0.5 0.7 1 4.0 16 205.505 5.0 1.5 0.0 1 1.5 17 0.08126 2673.87 5.0 1.5 1.0 0.7 1 1.5 18 0.00236 1956.6 5.0 1.5 1.0 0.7 1 4.0 19 0.00236 1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.06158 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 0.021 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 1620.4 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 1620.4 25.0 1.5 5.0 0.7 1 4.0 2	*	0.2938	25.0	1.5	1.0	0.7	-	2.0	14			0.003	
12.073 1.0 1.5 0.5 0.7 1 4.0 16 205.505 5.0 1.5 5.0 0.7 1 1.5 17 0.08126 2673.87 5.0 1.5 1.0 0.7 1 1.5 18 0.00236 1956.6 5.0 1.5 1.0 0.7 1 2.0 19 0.06138 1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 0.021 25.0 1.5 5.0 0.7 1 4.0 20 0.52226 0.021 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 1620.4 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 1620.4 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 1.5 25.0 1.5 5.0 0.7 <t< td=""><td>*</td><td>AN COLUMN</td><td>40.0</td><td>1.5</td><td>1.0</td><td>0.7</td><td>1</td><td>2.0</td><td>15</td><td></td><td></td><td>0.002</td><td></td></t<>	*	AN COLUMN	40.0	1.5	1.0	0.7	1	2.0	15			0.002	
205.505 5.0 1.5 5.0 0.7 1 1.5 17 0.08126 2673.87 5.0 1.5 1.0 0.7 1 1.5 18 0.00236 1956.6 5.0 1.5 2.0 0.7 1 2.0 19 0.06138 1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 0.021 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 0.007 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 1620.4 25.0 1.5 5.0 0.7 1 4.0 22 1 4.0 24 1 1.0 0.4 1 1.0 0.7 1 4.0 25 1 1 1.0 1 1 1 1.0	*	12.073	1.0	1.5	0.5	0.7	1	4.0	16			0.007	
2673.87 5.0 1.5 1.0 0.7 1 1.5 18 0.00236 1956.6 5.0 1.5 25.0 0.7 1 2.0 0.6158 1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 4.0 20 0.52226 0.021 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 0.007 25.0 1.5 5.0 0.7 1 4.0 22 0.40685 45.426 1.0 1.5 5.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 4.0 24 1.5 25.0 1.5 5.0 0.7 1 4.0 25 0.105 25.0 1.5 1.0 0.7 1 4.0 28 0.105	15	205.502	5.0	1.5	5.0	0.7	1	1.5	17	0.08126	0.002	0.002	1.0
1956.6 5.0 1.5 25.0 0.7 1 2.0 19 0.06158 1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 4.0 22 0.40685 0.021 25.0 1.5 25.0 0.7 1 4.0 22 0.40685 45.426 1.0 1.5 5.0 0.7 1 4.0 22 0.40685 1620.4 25.0 1.5 5.0 0.7 1 4.0 24 24 45.426 1.0 1.5 5.0 0.7 1 4.0 24 25 1620.4 25.0 1.5 5.0 0.7 1 4.0 24 25 0.15 1.5 5.0 0.7 1 4.0 27 25 25 0.105 25.0 1.5 1.0 0.7 1 4.0 28 29 0.008 25.0 1.0 1.0 0.7 1 1.0 20 20 0.038 40.0 1.0	3	2673.87	5.0	1.5	1.0	0.7	1	1.5	18	0.00236	0.0003	0.003	0.1
1.752 25.0 1.5 5.0 0.7 1 4.0 20 0.52226 2.249 25.0 1.5 1.0 0.7 1 10.0 21 0.40685 0.021 25.0 1.5 25.0 0.7 1 4.0 22 0.007 25.0 1.5 5.0 0.7 1 - 23 45.426 1.0 1.5 1.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 1.5 25 1.5 25.0 1.5 5.0 0.7 1 1.5 25 0.255 5.0 1.5 1.0 0.7 1 4.0 24 0.255 5.0 1.5 1.0 0.7 1 4.0 28 1.5 4.0 1.5 1.0 0.7 1 4.0 28 0.008 25.0 1.0 1.0 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 32 0.038 40.0 1.0 1.0 0.7 1 1.0 32	700	1956.6	5.0	1.5	25.0	0.7	1	2.0	19	0.06158	0.0014	0.0052	0.26
2.249 25.0 1.5 1.0 0.7 1 40.0 21 0.40685 0.021 25.0 1.5 25.0 0.7 1 4.0 22 45.426 1.0 1.5 1.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 4.0 24 1.5 25.0 1.5 5.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.0 28 0.008 25.0 1.0 1 1.0 30 0.038 40.0 1.0 1 1.0 31 0.038 40.0 1.0 1 1.0 32 0.038 1.0 1	0	1.752	25.0	1.5	5.0	0.7	1	4.0	20	0.52226	0.0010	0.0082	0.12
0.021 25.0 1.5 25.0 0.7 1 4.0 22 0.007 25.0 1.5 5.0 0.7 1 - 23 45.426 1.0 1.5 1.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 1.5 25 1.5 25.0 1.5 5.0 0.7 1 - 26 0.255 5.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 1.0 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 32 0.038 40.0 1.0 1.0 0.7 1 1.0 32	0	2.249	25.0	1.5	1.0	0.7	1	0.01	21	0.40685	0.0015	0.002	0.77
0.007 25.0 1.5 5.0 0.7 1 - 23 45.426 1.0 1.5 1.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 1.5 25 1.5 25.0 1.5 5.0 0.7 1 4.0 27 0.255 5.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 1.0 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 32 0.038 40.0 1.0 1.0 0.7 1 1.0 33	*	0.021	25.0	1.5	25.0	0.7	1	4.0	22			0.0082	
45.426 1.0 1.5 1.0 0.7 1 4.0 24 1620.4 25.0 1.5 5.0 0.7 1 1.5 25 1.5 25.0 1.5 5.0 0.7 1 4.0 27 0.255 5.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 1.0 0.7 1 1.0 30 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	0.007	25.0	1.5	.5.0	0.7	1	•	23			0.0082	
1620.4 25.0 1.5 5.0 0.7 1 1.5 25 1.5 25.0 1.5 5.0 0.7 1 - 26 0.255 5.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 - 0.7 1 1.0 30 0.038 40.0 1.0 1.0 0.7 1 1.0 32 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	45.426	1.0	1.5	1.0	0.7	1	4.0	24			0.0013	
1.5 25.0 1.5 5.0 0.7 1 - 26 0.255 5.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 - 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 31 0.038 40.0 1.0 1.0 0.7 1 1.0 32	2	1620.4	25.0	1.5	5.0	0.7	1	1.5	25			0.0015	+
0.255 5.0 1.5 1.0 0.7 1 4.0 27 0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 - 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 31 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	1.5	25.0	1.5	5.0	0.7	1	•	97			0.002	
0.105 25.0 1.5 1.0 0.7 1 4.0 28 1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 - 0.7 1 1.0 30 0.290 25.0 1.0 0.7 1 1.0 31 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	0.255	5.0	1.5	1.0	0.7	1	4.0	27			0.0013	
1.548 1.0 1.5 1.0 0.7 1 1.5 29 0.008 25.0 1.0 - 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 31 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	0.105	25.0	1.5	1.0	0.7	-	4.0	28			0.0015	
0.008 25.0 1.0 - 0.7 1 1.0 30 0.290 25.0 1.0 1.0 0.7 1 1.0 31 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	1.548	1.0	1.5	1.0	0.7	-	1.5	29			0.0009	
0.290 25.0 1.0 1.0 0.7 1 1.0 31 0.038 40.0 1.0 1.0 0.7 1 1.0 32	*	0.008	25.0	1.0	1	0.7	1	1.0	30			0.003	
0.038 40.0 1.0 1.0 0.7 1 1.0 32	*6	0.290	25.0	1.0	in all	0.7	-	1.0	31			0.002	
3001 03 1 0 1 0 0 6 0 7 1 1 0 33 0 0003	*0	0.038	40.0	1.0		0.7	-	1.0	32			0.002	
3001.02 1:0 1:0 0:3 0:1 1:0 33 0:0003	0	3001.02	1.0	1.0	0.5	0.7	-	1.0	33	0.0003	0.0009	0.0023	0.39

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **. This entry has been deleted from the data base.

Silicon Diodes - Data Summary (continued)

	Jurvey Data - Sor	3 :	Factor	and Summerized by Device Factor	o paz	è .	9		Survey Date	Date	Applications	Ratio
Failures	Operating 6 Hours X 10 ⁶	¥	۲,	.	22	္န	æ	LOG No.	60 ×	900 v	λ _b Predicted	Observed
06	11246.2	5.0	1.0	5.0	0.7	7	1.0	34	0.0083	0.0005	0.0013	0.36
21	1305.21	5.0	1.0	1.0	0.7	-	1.0	35			0.002	•
*	1.568	5.0	1.0	0.5	0.7	-	'	36			0.002	
635	5667.4	5.0	1.0	25.0	0.7	1	1.0	37	0.1133	0.0013	0.005	0.26
8	32.4786	25.0	1.0	5.0	0.7	, T	1.0	88			0.0082	
2*	5.747	25.0	1.0	1.0	0.7	1	1.0	39			0.002	
0	15.84	25.0	1.0	5.0	0.7	1	1.0	07	0.0577	0.00066	0.0023	0.28
*0	2.834	25.0	1.0	1.0	0.7	-	1.0	41			0.0015	
*0	410.173	1.0	1.0	1.0	0.7	-	1.0	42	,		0.0017	
32	11842.6	25.0	1.0	5.0	0.7	-	1.0	43			0.0015	+
•	4.738	25.0	1.0	25.0	0.7	1	1.0	77	0.19312	0.0005	0.0015	0.33
14	7301.25	25.0	1.0	5.0	0.7	1	1.5	45			0.0025	+
•	3132.05	5.0	9.0	5.0	1.0	1	•	95			0.0035	+
4	2472.75	5.0	9.0	1.0	1.0	1	1.0	4.7			0.004	+
8	0.5	25.0	9.0	5.0	1.0	-	•	87			0.002	
*	1.416	25.0	9.0	1.0	1.0	-	•	67			0.002	
*	10.8	1.0	9.0	1.0	1.0	1	1.0	20			0.000	
-	81.326	5.0	1.5	5.0	1.0	1	1	51	0.0248	0.0007	0.0035	0.2
*1	1.99	5.0	1.5	1.0	1.0	-	1	52			0.004	
*	0.673	5.0	5.0	1.0	1.0	1	1	53			900.0	A 10 10 10 10 10 10 10 10 10 10 10 10 10
	A STATE OF S										の の の の の の の の の の の の の の の の の の の	

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **. This entry has been deleted from the data base.

Silicon Diodes - Data Summary (continued)

Variance Ratio	Observed Predicted	1.15	0.33					201-00						
Predicted by Applications	λ _b Predicted	0.003		10.00	2000	0.0000	000 0		30 ST 10 ST	1000		2000	. 2	
8	60% 3 bob	0.0035						Nath of the					,	
Calculated from Survey Data	60% 3 ob	0.010	8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					on the same				N SOUTH AND A SOUTH ASSESSMENT OF THE PARTY	E.	8 # 5
	LOG No.				i de la composição de l									H
	<u>د</u>	1.3												
- Sorted and Summarized by Device and by π Factor	ပ္	1						o de la constante de la consta						
ized	*S2	1.0												
T L	0,	1.2												
and Sum Factor	¥	1.2							les :					
orted by #	m m	1.5										, and		
Survey Data - Sorted Type and by m	Operating 6 Hours X 10 ⁶	528.3	10TALS 25386.0								1,600	10.000.000		April 4 a 144 Observe pod 14
ng .	Failures	***	1450											1000

**Composite calculation.

Zener Diodes - Data Summary

1		1	1		1	1	1		Calan	1	Dundicted by	Variance
ž	Survey Data - Sorted Type and by m	by a	Factor	Sorted and Summarized by Device of by a Factor	o paz	nev	9		Survey Data	ata	Applications	Ratio
Failures	Operating 6 Hours X 10 ⁶	"E	"A	" 0	" S2	ပ္	# #	LOG No.	60% 3 ob	60% 3 bob	λ _b Predicted	Observed Predicted
*0	0.181	25.0	1	1.0	•	1	1	55			0.005	
*	0.013	40.0	-	1.0	•	•	,	56			900.0	
,	40409.3	1.0	1	0.5	,	1	•	57	0.0002	0.0004	0.0044	+
07	608.1	5.0	1	5.0	•	ı	,	58	9690.0	0.0028	0.0055	0.5
2	150.284	5.0	1	1.0	1	1	•	59	0.0419	0.008	900.0	1.3
*	0.570	5.0	-	0.5	,	1	•	9			0.004	
730	1465.59	5.0	1	25.0	•	1	ı	19	0.5033	0.004	0.0068	0.59
7	6.917	25.0	1	5.0	•	,	1	62	0.7590	900.0	0.0094	0.65
*	2.665	25.0	1	1.0	•	,	١	63			0.0052	
•	3.557	25.0	-	5.0	1	•	1	79	0.2572	0.002	0.0050	0.45
*	1.054	25.0	-	1.0	1	•	•	65			0.0042	
*	58.161	1.0	7	1.0	,	,	•	99			0.0039	
29	2681.7	25.0	7	5.0	•	1	1	29			0.0037	+
0	30.797	25.0	1	25.0	1	•	1	89			0.0037	+
-	592.923	25.0	1	25.0	•	•	•	69			0.0044	+
*	2.983	5.0	7	1.0	1	•	١	02			900.0	
*	65.62	1.5	7	1.0					0.0308	0.020	0.004	+
70	TOTALS	(%) (%)							No.		4,000,000	
911	2235.0											0.61
		New York									10.00	

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **.

Miscellaneous - Data Summary

35	Survey Data - Sorted Type and by m	- Sorted	and S Facto	and Summarized by Device Factor	zed b	y Dev	ice		Calculated from Survey Data	ed from Data	Predicted by Applications	Variance Ratio
Failures	Operating 6 Hours X 10 ⁶	πE	A ⁿ	ΨQ	" \$2	۳ٍс	* &	LOG NO.	60% λ ob	60% λ bob	λ _b Predicted	Observed Predicted
Thyristors								1933/95				
*	4.527	1.0	•	0.5	1	٠	1	11			0.010	•
12*	141.278	5.0	•	5.0	1	1	1	72			0.0022	
194	24.649	5.0	•	1.0	1	•	1	73			0.0025	
109*	57.0	5.0		25.0	1	1	10.0	74			0.0039	
27*	26.0	5.0	•	50.0	٠	ı	10.0	7.5			0.0039	
*	0.035	25.0	•	5.0	1	1	1.0	9/			0.0024	
*	0.052	25.0	•	25.0	1	٠	3.0	77			0.0024	
*	0.181	25.0	1	25.0	1	1	1	78			0.0024	
5	TOTALS					1					2.42	
167	253.65	5.0	•	13.6	ı	1	3.2		0.6743	0.003	0.003	1.0
Tunnel Diodes	des										The state of the s	
7	3.406	5.0	ť	5.0	ı	ı	•	79		0.048	0.034	
0	1.545	1.0	1	1.0	•	•	1	80			0.022	
5	TOTALS	10.										
1	4.95	3.75	,	3.75	ı	ı	ı		0.408	0.029	0.030	0.97
			UC S					10,000	3	atora .		
			,						ě		The second see	

*No failure rate was calculated for this entry. It is included in the composite calculation indicated by **.

Miscellaneous - Data Summary (continued)

Variance Ratio	Observed Predicted					0.75							0.57				
Predicted by Applications	λ _b Predicted		0.032	0.032		0.032	(Group VI)	0.003	0.002	0.0039	0.0012		0.0035	6854.0	0.000		
ed from Data	60% λ bob					0.042							0.002				
Calculated from Survey Data	60% λ ob					0.042		0.0562					0.246				
	LOG Na		81	82				80	6	10	11		12				
8	& ₽		1	1		•		1	1	1	1		1				
y Dev	μ _C		•	1		1		•	•	'	1		•				
zed b	" S2		1	1		ı		•	•	1	1		ı				
Immari	۳٩		5.0	1.0		1.32		5.0	1.0	25.0	1.0		24.5				
and Su Factor	"A		1	1		1		1	1	1	ı		ı				
rted and Sur by # Factor	πE		5.0	1.0		1.32		5.0	5.0	5.0	1.0		5.0				
Survey Data - Sorted and Summarized by Device Type and by " Factor	Operating Hours X 10 ⁶		1.718	20.026	TOTALS	21.74	Diodes	1.503	4.917	351.0	0.435	TOTALS	357.8		2000000		
'nS	Failures	Varactors	0	0	5.	0	Schottkey Diodes	0	0	85	0	OT.	85	100			

ADDENDUM

REPLACEMENT PAGES FOR
SECTION 2.2 DISCRETE SEMICONDUCTORS
OF MIL-HDBK-217B

2.2 DISCRETE SEMICONDUCTORS

The semiconductor transistors and diodes section has been revised to present the failure rate data on the basis of ambient or case temperature rather than normalized temperature and includes the effect of various quality grades and adjustment factors on the failure rate. An analytical model of the failure rate is also presented.

The applicable MIL specification for transistors and diodes is MIL-S-19500. The quality levels (JAN, JANTX, JANTXV) are as defined in MIL-S-19500.

The general failure rate model for transistors and diodes is:

 $\lambda_{\rm p} = \lambda_{\rm b} (\Pi_{\rm E} \times \pi_{\rm A} \times \pi_{\rm Q} \times \pi_{\rm S2} \times \pi_{\rm C} \times \pi_{\rm R})$ failures/10⁶ hours where the various factors are defined in Section 1.

The various types of semiconductors require different failure rate models that vary to some degree from the basic model. The semiconductor generic groups are shown in Table 2.2-1. The specific failure rate model and the π factor values for each group are shown in the section dealing with that group.

TABLE 2.2-1
DISCRETE SEMICONDUCTOR GENERIC GROUPS

	Part Type	Group
A.	Transistors	
	Silicon NPN Germanium PNP	
	Silicon PNP Germanium NPN	I
	Field Effect Transistors	II
	Unijunction	III
В.	Diodes and Rectifiers	
	Silicon (General) Germanium (General)	IV
	Voltage Regulator (2ener, Avalanche) Voltage Reference (Temp. Comp. Zener, Avalanche)	v
	Thyristors	VI
c.	Microwave Semiconductors and Special Devices Detectors Mixers	VII
	Varactors Step Recovery Tunnel	VIII
	Microwave Transistors	IX

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MIL-HDBK-217B 20 SEPTEMBER 1974 DISCRETE SEMICONDUCTORS

The equation for the base failure rate, λ_h , is:

$$\lambda_{b} = \lambda e^{\left(\frac{N_{T}}{273 + T + (\Delta T) S}\right)} e^{\left(\frac{273 + T + (\Delta T) S}{T_{M}}\right)^{P}}$$

where

A is a failure rate scaling factor.

e is the natural logarithm base, 2.718

NT, TM and P are shaping parameters.

- T is the operating temperature in degrees C, ambient or case, as applicable (see Section 2.2.9 for instructions).
- AT is the difference between maximum allowable temperature with no junction current or power (total derating) and the maximum allowable temperature with full rated junction current or power.
- S is the stress ratio of operating electrical stress to rated electrical stress (see Section 2.2.9 for S calculation).

The values for the constant parameters are shown in Table 2.2-2. The resulting base failure rates as functions of temperature and electrical stress are shown in tables for each part type in Sections 2.2.1 through 2.2.8. These tables are based on the typical maximum junction temperatures (fully derated) of 100 degrees C for germanium (70 degrees C for microwave types) and 175 degrees C for silicon (150 degrees C for microwave types) as well as a value of 25 degrees C for the maximum temperature at which full rated operation is permitted. If device temperature ratings are different from these values, see Section 2.2.9 for S calculations to compensate for these differences.

The base failure rate tables contain failure rates up to full rated conditions. If a particular operating condition of S and T is high enough to fall into a blank portion of the table, the device is overstressed, and a device with greater power rating should be selected for the application.

TABLE 2.2-2
DISCRETE SEMICONDUCTOR BASE FAILURE RATE PARAMETERS

			D	tants		
Group	Part Type	A	NT	TM	P	AT'
Transistors		E (7.5) 4	第7年 後期間	1 36		
	Si, NPN	0.13	-1052	448	10.5	150
ı	Si, PNP	0.45	-1324	448	14.2	150
•	Ge, PNP	6.5	-2142	373	20.8	75
	Ge, NPN	21.	-2221	373	19.0	75
. II press n	PET TO A SERVICE AND ADDRESS OF THE	0.52	-1162	448	13.8	150
III	Unijunction	3.12	-1779	448	13.8	150
Diodes	mater best followers that	15 15 15 15	Sparier	HON NA	W.	
. mwon vio. th	Si, Gen. Purp.	0.9	-2138	448	17.7	150
IV	Ge, Gen. Purp.	126	-3568	373	22.5	7!
٧	Zener/Avalanche	0.04	-800	448	14	150
VI	Thyristors	0.82	-2050	448	9.6	150
TOTAL C REPT	Microwave	0.003330	29 t 3 5 8		tivi) a	17/1
101 C sumilian	Ge, Detectors	0.33	-477	343	15.6	4!
taytes tion 2.2.9	Si, Detectors	0.14	-392	423	16.6	125
VII	Ge, Mixers	0.56	-477	343	15.6	45
dala al	Si, Mixers	0.19	-394	423	15.6	125
AIII	Varactor, Step Recovery & Tunnel	93	-1162	448	13.8	150
Transistors IX	Microwave	See 8	Section 2	.2.9		

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DISCRETE SEMICONDUCTORS CONVENTIONAL TRANSISTORS

2.2.1 Transistors, Group I

SPECIFICATION

MIL-S-19500

Si, NPN
Si, PNP
Ge, PNP
Ge, NPN

Part failure rate model (λ_p) :

$$\lambda_{P} = \lambda_{b} (\pi_{E} \times \pi_{A} \times \pi_{Q} \times \pi_{R} \times \pi_{S_{2}} \times \pi_{C})$$
 failures/10⁶ hours

where the factors are shown in Tables 2.2.1-1 through 10.

TABLE 2.2.1-1 $\pi_{\rm E}$ FOR GROUP I TRANSISTORS

Environment	G _B	$s_{\rm F}$	G _F	N _S	AIT	A _{UT}	G _M	NU	A _{IF}	A _{UF}	ML
π _E	1	1	5	10	12	20	25	25	25	40	40

TABLE 2.2.1-2
TABLE 2.2.1-2
TABLE 2.2.1-2

Application	π _A
Linear	1.5
Logic Switch	0.7
High Frequency (freq. > 400 MHz and aver. power <300 mw.)	5.0

TABLE 2.2.1-4
TR FOR GROUP I TRANSISTORS

Power Rating (watts)	π _R
≤1	1
> 1 to 5	1.5
> 5 to 20	2.0
> 20 to 50	2.5
> 50 to 200	5.0

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TABLE 2.2.1-3
TO, FOR QUALITY FACTOR

Quality Level	π _Q
JANTXY	0.12
JANTX	0.24
JAN	1.2
Lower*	6.0
Plastic**	12.0

*Hermetic packaged devices.

**Devices sealed or
encapsulated with organic
materials.

2.2.1-1

MIL-HUBK-217B 7 SEPTEMBER 1976 DISCRETE SEMICONDUCTORS CONVENTIONAL TRANSISTORS

TABLE 2.2.1-5 "S2 FOR GROUP I TRANSISTORS

Voltage Stress, $S_2 = \frac{Applied (V_{CE})}{Rated (V_{CEO})} \times 100$

S ₂ (percent)	"s ₂ *	*- (0133)s
100	3.0	*- "S2=0.14(10)(.0133)S
90	2.25	for S2≥22
80	1.65	"S ₂ =0.3 for S ₂ < 22
70	1.2	
60	0.88	gF
50	0.64	
40	0.48	A Francisco F
30	0.36	
20	0.30	
10	0.30	
Live Both	0.30	3-1 to 2 treat

TABLE 2.2.1-6 T FOR GROUP I TRANSISTORS

Complexity (1)	π _C
Single Transistor	1.0
Dual (Unmatched)	0.7
Dual (Matched)	1.2
Darlington	0.8
Dual Emitter	1.1
Multiple Emitter	1.2
Complementary Pair	0.7

(1) Each transistor in a case must be treated individually for complexity factor. Its failure rate, λ , modified by other π factors and then multiplied by this complexity factor. If only one transistor of a pair is used, treat as an independent item with \$\pi_C = 1.0\$. Supersedes page 2.2.1-2, 20 Sep 74

MIL-HDBK-217B
7 SEPTEMBER 1976
DISCRETE SEMICONDUCTORS
CONVENTIONAL TRANSISTORS

TABLE 2.2.1-7 MIL-S-19500 TRANSISTORS, GROUP I, SILICON, NPN BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 10⁶ HOURS

PC)	!		1	!		•	,	1		. 3		!		. 4		!		. 5			•	6	1	•	7		. 8	1		.9	1	1.	0
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10																									9	1.1	113		.0			02	
20		00	43	1	. :	0	51	1.	0	06	0		00	7	1	1.	00	8	4		1	0			2		15		.0		1.	02	9
25																							1.0				17		.02		1.	033	
30		00	48	1	•	00	57		0	96	7		0	27	9		0	9	5	•	1	1	1.	01	4	0.00	18		.0				
50																							1.	-		D. 50 %	23	1	.0	,,	-		
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55		00	64	i	. :	00	75	i.	0	08	9		01	10			01	13			1	7	i .	02	3		33	i			i		
60																	000	20.70					1.		0.00	1		1			1		
65	1	00	71	1	(0	94	1.	0	10		1	0	12		1.	01	15		1.1)2	0	1.	02	9	1		1			1		
	•			1				!			-					1							!			1		1			1		
70													0				-	1000					1.	03	3	!		!			!		
75		00	79	1	. 5	00	45		0	11			01	4		1:				5	202		!					1			1		
00		170	-	1	• (, ,	0		5				0.				0.	20			, ,	•						i			1		
85		00	89	1	. :	1	2	i .	0	13			0	17			02	23			03	3	15					i			i		
90								i.					0			١.							i			i		1			1		
95								1.					0			1.				1			1			1		1			1		
	1			1				1				1				1				1			1			1		!			!		
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05		01	1	1		31	4	1.	2	18			8	25									1					!					
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35	•	1	5			2		1			1												1			1		1			1		
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DISCRETE SEMICONDUCTORS CONVENTIONAL TRANSISTORS

TABLE 2.2.1-8

MIL-S-19500 TRANSISTORS, GROUP I, SILICON, PNP

BASE FAILURE RATE, \(\lambda_b\), IN FAILURES PER 10⁶ HOURS

c)	# [• 1	1 .2	3	. •4	.5	1 .6	1 .7	.8	.9	1.0
	-0045	1.0057	.0070	-0085	-010	1-012	1.014	.018	.022	.030
10	.0052	1.0065	.0080	.0096	1.011	1.012	1.015	.021	1.027	1.029
201	.0061	1.0075	1.0091	.010	1.013	1.015	1.319	.024	1.034	053
		0800.			.013			SHIP HEREDONE THE SOUR	.039	.063
		1.0085				1.021			1.063	ac-s
		1.010						.053		i
		1	1	1	1	1	1	1		1
		1.011			1.021		1.039	.063	12.14	
			015		1.024		1.053	6.0 . 1.81	000014	1932
	•		•		•	1				
	.011		1.016		1.027	The second secon	1.063	12.19	60,16	Srig &
		1.014				1.045		1.0	20 10	17 17 11
-0	.013	1.015	1.014	.024	.034	1.053				
85	.013	1.016	.021	.027	.039	1.063	1			1
And the same	The second secon	STATE OF THE PARTY OF THE PARTY.	5. 77 C. E. L. C.		1.045			100	1000	Oc.
95	.015	1.019	1.024	.034	1.053		26,1			ing
00	.016	.021	.027	.039	.063	i				
05	.018	1.022	1.030	.045		1	1			1
10	.019	1.024	.034	.053		!		Sid. and		
15	.021	.027	.039	.063						
	.022		1.045			1	i i		0.0348	
25	.024	1.034	1.053			!	!	5000		100
20	.027	.039	.063			1				
	.030	1.045	1						CHOICE W. C.	CR V
40	.034	.053					1			
4-	03-							and the		
	.039	1.063							A.C.	96 . 7
San	.053	i				1				
		!			10.		!!!			
601	.063									100

MIL-HDBK-217B
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DISCRETE SEMICONDUCTORS
CONVENTIONAL TRANSISTORS

TABLE 2.2.1-8 MIL-S-19500 TRANSISTORS, GROUP I, GERMANIUM, PNP BASE FAILURE RATE, λ_b , IN FAILURES PER 10⁶ HOURS

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oc)	-			1	1				2	1			3	1	-		4		1	-		5	1		. 6	5			7	1		. 8	1	H		9	1	1	. 0
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2.2.1-5

MIL-HDBK-217B
7 SEPTEMBER 1976
DISCRETE SEMICONDUCTORS
CONVENTIONAL TRANSISTORS

TABLE 2.2.1-10 MIL-S-19500 TRANSISTORS, GROUP I, GERMANIUM, NPN BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 10⁶ HOURS

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40	•	0	2			0	26	,	•	0:	2	1	•	0.3	39			0	50			96	7		09	5	1.	14		1			-	
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2.2.1-6

DISCRETE SEMICONDUCTORS

2.2.2 Transistors, Group II

SPECIFICATION

DESCRIPTION

MIL-S-19500

Silicon Field Effect Transistors

Part failure rate model (\lambda_p):

 $\lambda_P = \lambda_b (\pi_E \times \pi_A \times \pi_Q \times \pi_C)$ failures/106 hours

where the factors are shown in Tables 2.2.2-1 through 5.

TABLE 2.2.2-1
TE FOR GROUP II TRANSISTORS

TABLE 2.2.2-2

TABLE 2.2.2-2

Environment	E
G _B	1 *
s _F	1
G _F	5
NS	10
AIT	12
AUT	20
G _M	25
N _U	25
AIF	25
A _{UF}	40
ML	40

Application	A
Linear	1.5
Logic Switch	0.7
High Frequency (freq. > 400 MHz. + aver. power < 300 mw)	5.0

TABLE 2.2.2-3
To FOR GROUP II TRANSISTORS

Complexity	^π c
Single Device	1.0
Dual Unmatched Dual Matched	0.7
Dual Complementary Tetrode	0.7

TABLE 2.2.2-4
TQ, QUALITY FACTOR

Onality Level	π _Q
JANTXV ,	0.12
JANTX JANTX	0.24
Lower+	6.0
Plastic**	12.0

*Hermetic packaged devices.

**Devices sealed or encapsulated
with organic materials.

Supersedes page 2.2.2-1, 20 Sep 74 2.2.2-1

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20 SEPTEMBER 1974

DISCRETE SEMICONDUCTORS

FET

GRP. II, FET BASE FAILURE RATE (F./]06 HRS.)

00)				1	!			2				3	1		. 4	•	1		. 5	1		. 6	1		• 7	1		. 8	3		.9	1 1.
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10					١.	0	1	2				5	١.	0	18	3			21	1.		24	1.	. 0	29	1		3		.0	47	1.06
20					1.					0.0			1 .				1.		23			28			34			047		.0		1.10
30				3	١.	0	1	6		0		9	1.	0	22	2	1.	0	26	1.	0	31			39			5		.0		1
47					1 .			A		0									29			36			47			066		. 1	0	1
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								200															-			-						

DISCRETE SEMICONDUCTORS UNIJUNCTION

2.2.3 Transistors, Group III

SPECIFICATION

DESCRIPTION

MIL-S-19500

Unijunction

Part failure rate model (\lambdap):

 $\lambda_{\rm p} = \lambda_{\rm b} \times \pi_{\rm E} \times \pi_{\rm O}$ failures/106 hours

where the factors are shown in Tables 2.2.3-1 through 3.

TABLE 2.2.3-1
TE FOR GROUP III TRANSISTORS

TABLE 2.2.3-2 TQ, QUALITY FACTOR

Environment	π _E
$G_{\mathbf{B}}$	1
SF	1
$G_{\mathbf{F}}$	5
Ns	10
AIT	12
A _{UT}	20
G _M	25
NU	25
AIF	25
AUT	40
ML	40

Quality Level	ΨQ.
JANTXV	0.5
JANTX	1.0
JAN	5.0
Lower*	25.0
Plastic**	50.0

*Hermetic packaged devices. *

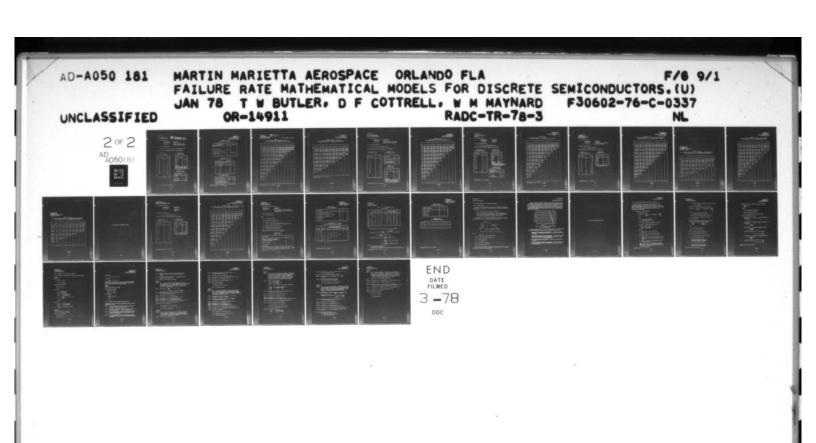
**Devices sealed or encapsulated

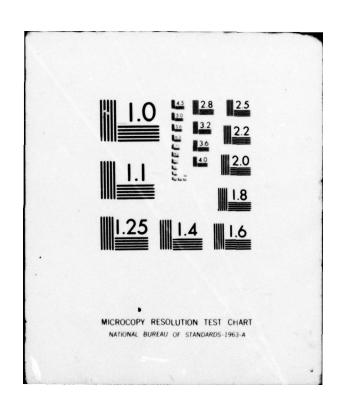
with organic material.

Supersedes page 2.2.3-1, 20 Sep 74

TABLE 2.2.3-3 MIL-S-19500 TRANSISTORS, GROUP III, UNITUNCTION BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 10⁶ HOURS

°C)			1	1			2	1		. 3	1		. 4	!			5	1		6	1	. 7	1		. 8	1		,	1	. 0
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70				1.	0	2	8			36		-	47			200			09	5	1.	15	į			!				
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A 5		72		1	2	3	6	1 .	2	. 7	1	.0	64	1	. (19	5	1	15		1		1			1				
90				1.			9	1.	0	52	1.	. 0	73	1				i	•		i		i			i				
95		03	3	1.	0	4	3	1.	0	68	1.	. 0	83	!	•			1			1		1			1				
00				1.						4	1		95	i	. !	5		i			i		i			i				
10	•	03	3	1.	00	5	8	1.	0	73		1		1				1			1		1			1			-	
- 1				1	0		1	1		5	1.	1		1				1			1		1			1				
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25					0				13)	1			!				!			1		1			1				
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351		7	3	1.	1	1		1			1			1				1			1		1			1				
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45				1 .	1	5		1			1			i				1			1		i			1				
50				1				1			1			1				1			1		1			1		1		
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				!				!			1			1				!			1		1			!		1		





DISTRETE SEMICONDUCTORS DISDES, GENERAL PURPOSE

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2.2.4 Picdes, Group IV

SPECIFICATION

DESCRIPTION

MIL-S-19500

Silicon, General Purpose Germanium, General Purpose

Part failure rate model (\(\lambda_p\))

 $\lambda_p = \lambda_b (\pi_E \times \pi_Q \times \pi_R \times \pi_A \times \pi_{S_2} \times \pi_C)$ failures/10⁶ hours where the factors are shown in Tables 2.2.4-1 through 8.

TABLE 2.2.4-1 TE FOR GROUP IV DIODES

Environment	π _E					
G _B	22 1					
SF	1					
G _F	5					
NS	10					
AIT	12					
AUT	20					
GM	25					
NU	25					
AIF	25					
AUF	40					
ML	40					

TABLE 2.2.4-2 TO, QUALITY FACTOR

Quality Level	πQ
JANTXV	0.15
JANTX	0.3
JAN	1.5
Lower* Plastic**	7.5 15.0

*Hermetic packaged devices.

**Devices sealed or encapsulated
with organic material.

TABLE 2.2.4-3 π_R FOR GROUP IV DIODES

Current Rating (amps.)	π _R
≤1	1
> 1 to 3 > 3 to 10	2.0
>10 to 20	4.0
>20 to 50	10.0

SHARE FROM 2 . S. L. P. A. MINE

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2.2.4-1

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DIODES, GENERAL PURPOSE

TABLE 2.2.4-4 TABLE 2.2.4-4 TABLE 2.2.4-4

PEST AVAILABLE CON

Application	T _A							
Small Signal (≦500 ma.)	1.0							
a formancian in that the								
Logic Switching	0.6							
Power Rectifier (>500 ma.)	1.5							
Power Rect. (H.V. Stacks)	2.5/junction							
V max > 600								

TABLE 2.2.4-5 TS2 FOR GROUP IV DIODES

 V_R = diode reverse voltage. Applied V_R x 100

S ₂ (Percent)	^π s 2
0 to 60	0.70
70	0.75
80	0.80
90	0.90
100	1.0

TABLE 2.2.4-6 C, CONSTRUCTION FACTOR

Contact Construction	π _C
Metallurgically Bonded	1
Non-metallurgically Bonded (Spring loaded contacts)	2

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DIODES, GENERAL PURPOSE

BEST AVAILABLE COPY

DIODES, GENERAL PURPOSE

TABLE 2.2.4-7 MIL-S-19500 DIODES, GROUP IV, SILICON BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 106 HOURS

(°C)	•		•	1	1				?		1		•	3	1			•	4		1			5		1		. 6	•	1	,	. 7	1			. 8	1		•	9	1	1	•	0
		-	-	-	5 1	-	-	-	-	7	-	-	5	10	- 1	-	-	0	1	-		-	-	1	5	-	0	2	5	-	50	53	3	-	-	4	3 1	-	00	5	;		0	37
10	١.	1	0	0	51		0	0	0	9	١.	0	0	13	1		0	0	1	7		0	0	2	3	١.	00)3	10	١.	00	03	0		00	15	21		00	77	21	.0	1	1
20		0	0	0			0	0	1	2		0	0	16	5		0	0	2	1		0	0	2	7		00)3	16		21	06	7		0	16	41		00	9	,	. (11	6
25																																									!	.,	JZ	,
40		2	0	1	3 1	:	2	0	1	4		0	0	23	3	:	0	0	3			0	0	3	3		0) 5	2		0	37	2		01	1	-		02		i			
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55		1	0		7 1		1	0	,	3		0	0	30	1		0	0	30	9		0	0	5	2		01	17	12	1.	0	11			0:	20		200			1			
50																																									i			
65	١.	7	0	2	11		0	0	2	7	١.	C	0	36	1		0	0	4	7		0	0	6	4	!.	0	9	5	!.	0	15					1				!			
70		1	0	2	3		7	0	3	0		n	0	3 9)		0	0	52	2		0	0	7	2		0	11			0	20		100							1			
75		0	0	2	5 1		0	0	3	3		0	0	4	3 1		0	0	5	7		0	0	8	2		0	E)	1							-				1			
50			0	5	7!	•	0	0	3	6		0	0	4	7 1	•	0	0	6	4		C	0	9	5		0	16	•	1											1			
25																											0	20)	i											i			
90	1 .	2	0	3	3		0	0	4	3		0	0	5	7	•	0	0	8	2		0	1	3		!				!											!			
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175			U	54	• '	•	J	U	7	5	·	1.	•	•	1															1							1				i			
130												0	2	0	1											i				1							i				i			
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160		7	2	0	!										1															i											i			
	1				1										!					-						1				1							1	1 31			1			

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TABLE 2.2.4-8 MIL-S-19500 DIODES, GROUP IV, GERMANIUM BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 106 HOURS

C)		1	!	٠.	2	•			3	•		-	. 4		1	-	-	5	-		-	6	1		. 7	-			8	1		. 9		1	. 5
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	.20																																		
	.00																																		
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301	.00	13	١.	00	1	7		00	2	2	١.	0	0	30	1 .	0	0	40	1	.0	0	54	1.	0	07	7		01	1	1	.0	19	1	1	
351	.00	15	1.	20	2	01		00)?	7	١.	0	03	36	1 .	. 0	0	49	11	. 0	0	68	1.	0	10			01	6	1				1	
401	.00	19	١.	00	2	5		00) 3	3	١.	0	04	.4	1 .	0	0	61	.1	.0	0	87	1.	0	13			02	4	1					
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501	.00	40	١.	00	5	4		00	7	7		0	11		1.	0	1	9	1				i			i				i					
	.00		2000										200		1				1				1			1				1					
701	.00	61	١.	00	19	71		01	. 3			0	24	•	1				1				1			1				1			1		
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,			1												1				1				1							i					

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DISCRETE SEMICONDUCTORS ZENER AND AVALANCHE DIODES

2.2.5 Diodes, Group V

SPECIFICATION

DESCRIPTION

MIL-S-19500

Voltage Regulator and Voltage Reference (Zener & Avalanche)

Part failure rate model (λ_p) :

 $\lambda_{p} = \lambda_{b} (\pi_{E} \times \pi_{A} \times \pi_{Q}) \text{ failures/106 hours}$

where the factors are shown in Tables 2.2.5-1 through 4.

TABLE 2.2.5-1 TE FOR GROUP V DIODES

TABLE 2.2.5-2

TABLE 2.2.5-2

TABLE 2.2.5-2

Environment	π _E
G _B	1
SF	1
G _F	5
NS	10
AIT	12
AUT	20
G _M	25
NU	25
AIF	25
AUF	40
ML	40

Application	enπ _A seco Anti-reos
Voltage Regulator	1.0
Voltage Reference (Temp. Compensated)	1.5

TABLE 2.2.5-3

Quality Level	, π _Q
JANTXV	0.3
JANTX	0.6
JAN	3.0
Lower* Plastic**	15.0 30.0

**Hermetic packaged devices.

**Devices sealed or encapsulated
with organic materials.

Supersedes page 2.2.5-1, 20 Sep 74

2.2.5-1

TABLE 2.2.5-4 MIL-S-19500 ZENER DIODES, GROUP V BASE FAILURE RATE, λ_b , IN FAILURES PER 10⁶ HOURS

7	!		S							
(OC)	•1	•2	• 3	• 4	.5	.6	.7	.8	.,	1.0
	.0024	.0028	.0032	.0036	.0041	.0046	.0052	.0061	.0073	.0094
10	1.0027	1.0031	.0035	.0039	1.0044	.0050	,005	0008	.0086	.011
25	.0031	.0033	.0039	.0044	.0050	.0058	.0068	.0086	.011	.018
30	.0032	:8836	-0041	-0046	1.0052	.0051	.0073	-0094	.013	1
40	.0035	.0039	.0044	.0050	.0058	.0068	.0086	.011	.018	367
20	.0030	1.0042	-0046	.00>>	.000-	.00/3	.010	.013		100
		.0044						.018		1
		1.0046							å	
05	.0042	.0048	.0099	.0004	.0079	.010	.015		1 1 1 1 1 1 1	
		.0050			.0086	.011	.018	i		1
75	.0046	0052	.0061	.0073	,0094	.013				
10	.3048	:0055	.000-	.0079	.010	.019				194
85	.0050	.0058	.0068	.0086	1.011	.018				1
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95	.0055	.0064	.0379	.010	.015					
100	.0058	1.0068	.0086	.011	.018			i		i
		-0073			!					
110	.0064	.0079	.010	.01>						THE
		.0086		.018			25			1 100
		.0094								400
125	.0079	.010	.015				7.7			372
130	.0086	.011	.018		- more march				i. /	i
	.0094			77.9				!		!
140	.010	.015								
145	.011	.018			1			1		Ι,
	.013									
155	.015						Colorate Grand		and the second	
160	.018									
	dip was to	St. Commence	19840						•	
	here with	acquistage.	in the line	- 895 J	1000 Sec. 3					

DISCRETE SEMICONDUCTORS THYRISTOR

2.2.6 Diodes, Group VI

SPECIFICATION

DESCRIPTION

MIL-S-19500

Thyristors

Part failure rate model (\lambda_p):

 $\lambda_{\rm P} = \lambda_{\rm b} \times \pi_{\rm Q} \times \pi_{\rm E} \times \pi_{\rm R}$ failures/10⁶ hours where the factors are shown in Tables 2.2.6-1 through 4.

1

5

10

12

20

25

25

25

40

40

TABLE 2.2.6-1
To FOR GROUP VI DIODES

"E	FOR	GROUP	VI	DIODES
Env	viron	nment		
Env	viro	nment		

GB SF

GF

NS

AIT

AUT

GM

NU

AIF

AUF

ML

	TABLE	2.	2.6-2
πQ,	Quali	lty	Factor

Quality Level	π _Q
JANTXV	.5
JANTX	1.0
JAN	5.0
Lower* Plastic**	25. 50.

*Hermetic packaged devices. *

**Devices sealed or encapsulated

with organic material.

TABLE 2.2.6-3
TR FOR GROUP VI THYRISTORS

Rated Average Forward Anode Current (amps.)	π _R
≤1	9 2
> 1 to 5	3
> 5 to 25	10
> 25 to 50	15

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TABLE 2.2.6-4
MIL-S-19500, GROUP VI, THYRISTORS
BASE FAILURE RATE, λ_b , IN FAILURES PER 10⁶ HOURS

oc)	•1	1 .7	.3	.4	.5	.6	.7	.8	.9	1.0
20	.000g .0010	1.0009 1.0012 1.0015 1.0016	.0020	.0022	.0030	.0039 .0048 .0053	.0072	.010	.0081 .010 .012 .014	.011 .014 .019 .022
401	.0016	1.0022	1.0030	.0039	1.0053	1.0072	1.010	.014	.022	7
601	.0024	1.0030	1.0044	1.0059	1.0081	1.011	.014	.022	MEGN	gland of
751	.0033	1.0039	1.0059	.0081	1.011	.014	.022			80 188
90	1.0044	1.0053	1.0081	1.011	1.014	.022	63			- 10 - 10 - 10 - 10 - 10
105	1.0059	1.5072 1.5071 1.5090	1-011	.014 .017 .019	.022		01 11			SET SET Naith
120	.0081	Charles Charles Co.	1.017	.022	905		1 44 1 44			
135	AND DESCRIPTION OF THE PARTY OF	.014	.022		to to					
150	.014	.022	 							
150	.022									

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2.2.7 Diodes, Group VII

SPECIFICATION

DESCRIPTION

MIL-S-19500

Microwave Detectors and Mixers, Silicon and Germanium

Part failure rate model (λ_p) :

failure rate model (λ_p) : $\lambda_p = \lambda_b \times \pi_E \times \pi_Q$ failures/10⁶ hours

where the factors are shown in Tables 2.2.7-1 through 6.

TABLE 2.2.7-1 TE FOR GROUP VII DIODES

Invironment	π _E
G _B	1
S _F	1
G _p	10
N _S	15
GB SFGF NS	25
AUT	40
A _{UT} G _M N _U	50
N _{tt}	50
A	50
A _{UF}	80
M,	200

TABLE 2.2.7-2 TQ, QUALITY FACTOR

Quality Level	ΨQ
JANTXV	8+0. 1
JANTX	2
JAN	3.5
Lower *	5.

*Hermetic packaged devices.

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DISCRETE SEMICONDUCTORS MICROWAVE DIODES

TABLE 2.2.7-3 MIL-S-19500 DIODES, GROUP VII SILICON MICROWAVE DETECTORS BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 10⁶ HOURS

(°C)	•1	1 .2	1 .3	1 .4	1 .5	1 .6	1 .7	1 .8	1 .9	1 1.0
	.035	1.037	1.039	1.042	1.044	1.047	1.050	1.055	1.062	1.075
		1.038		1.042		1.048	1,052	1.057	1.066	1.082
10	.037	1:039	1:041	1.043	1:046	1:049	1:054	1:060	1.072	1:092
15	.038	1.040	1.042	1.044	1.047	1.051	1.056	.064	1.078	1.10
The East		1.041		1.046	1.049			1.069		1.12
25	.039	1.042	1.044	1.047	1.050	1.055	1.062	1.075	1.098	1.15
30	.040	1.042		1.048	1.052	1.057	1.066	1.082		1
	.041	1.043		1.049	1.054	1.060	1.378	1.092	1.13	!
70	.042	1	1	1	1	1	1	1	i -	;
	.043		1.049			1.069		1-12	1 200	!
	.044	1.048		1.057	1.062	1.075	1.398	1.15		
		!	1	1	THAT]	1	1	!	1	1
	1.046	1.049	1.054	1.064	1.072	1.092	1.13			
September 1	049	1.053		1.069	1.087	1,12	i	i	i	i
70		!	!	!	1 000	!	!	!	!	1 -0-
	.050	1.055	1.062	1.075	1.098	1.15			i	
C. C	.054	1.057	1.072	1.092	1.13	!	!	!	!	!
90	.056	1.064	1.078	1.10	Special Section		No.		1	
95	.059	1.069	1.087	1.12	i	i	1.00	i	i	i
100	.062	1.075	1.098	1.15			100		!	
105	.066	.082	1.11	45	i .	i	i	1	i	
1.50 F 121 E 1 H 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	.072		1.13		!	!	100	!	!	!
115	.078	1.10					OCE I			
THE RESERVE OF	.087	1.12	1	!	1	!	!	!	!	!
	.098	1.15				-				
130		i •	i	i	i	i	i .	i	i	i
135	.13	!	!		!	!	!	!	!	!

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DISCRETE SEMICONDUCTORS
MICROWAVE DIODES

TABLE 2.2.7-4

MIL-S-19500 DIODES, GROUP VII, GERMANIUM MICROWAYE DETECTORS

BASE FAILURE RATE, \(\lambda_b\), IN FAILURES PER 10⁶ HOURS

10011		1 .2	1 .3	1 .4	1 .5	1 .6	1 .7	1 .8	1 .9	1 100
(0)		1	1	1	51.	1	10	1	1-1-60	1
01	.061	1.053	1.066	1.069	1.072	1.076	1.080	1.085	1.092	1.10
						1.081				1.11
						1.087				1.12
151	-070	1-073	1.077	1.082	1.067	1.094	1.10	1.11	1.12	1.14
			SAC.I					1.13		1.17
						1.11		1.15	and the second second	1.22
										9 St. St.
301	.083	1.089	1.097	1.10	1.11	1.13	1.15	1.18	i .	
			1.10		1.13	1.15	1.18	1	1	1
401	.099	1.10	1-12	1.13	1.16	1.19	!	12 0 1 3	Two Sec	1,120
451	.11	1.12	1.14	1.16	1.19	i			1	
501	.12	1.14	1.16	1.20	1	1	1	1	1	1
551	.14	1.17	1.20	1	1	1				!
601	.17	1.21	i	i	i	i	i	i	i	I DE
651	.21	1 *	1	1	1	1	1	1	1	1

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DISCRETE SEMICONDUCTORS
MICROWAVE DIODES

TABLE 2.2.7-5 MIL-S-19500 DIODES, GROUP VII, SILICON MICROWAVE MIXERS BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 10^6 Hours

°C)	•1	1 .2	1 .3	.4	1 .5	1 .6	• 7	.8	. 9	1 1.5
	.047	1.050	1.053	.056	1.060	1.064	. 269	.076	.086	1.10
	.050	1.053	1.056	.058	1.063	1.068	:371	.079	.092	:11
	.051	1.054		.061	1.065			.089		:14
	.053				1.069		.086			1.20
	.055	1.05A			.071				.15	B 8
	.056	1.059			1.074			.12	1.18	1
	.058	1.062						.16		
	.061	1.064	1.069		1.086	1.10	.13	1.20		
	.063	.068		.083	1.099		.18		36	2.0
	.067	1.070			1.10	1.14	90.		Edt.	100
100000000000000000000000000000000000000	.069	1.076	1.086	.10	.13	1.20			Pagin	800
89	:871	1.883	1.892	: 13	:łå	80.	90,1	10.1	EFEVE	of a
	.077	.089	1.10	.14					190	450
	.081	1.10	1.12	.16		Link to	01,1	P. F. F.	0000	F24.
	.092	1.11	1.15		f i i i i i i i i i i i i i i i i i i i	1000	212	(B) + 1	000	Dign.
	.10	1:12	1.18		1					1
20	.12	1.16	1		1	1	98,10	1		1 91
251	.13	1.20	1							!
	1	1 .	i		i	1			15.	
.35	.18	1								

2.2.74

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DISCRETE SEMICONDUCTORS
MICROWAVE DIODES

TABLE 2.2.7-6 MIL-S-19500 DIODES, GROUP VII, GERMANIUM MICROWAVE MIXERS BASE FAILURE RATE, $\lambda_{\rm b}$, IN FAILURES PER 10⁶ HOURS

C)			. 1	!		.2	!		.3	1		.4	1		.5	!		.6	!		. 7	!	. 8	!	.9	!	1.0
!	-	-		!-	-		-	-		-				100	-	7		2			; •	-	4		5	-	
51				1.															1.			1.					
101															3						5						
10	•			i	•			•			•		ï			i			i	•		1		1		1	
151		11		١.	1	2		1	3	١.	1	3	i.	. 1	4	1	. 1	6	i.	1	7	1.1	19	1 . 2	21		25
201	175	1000		i.								March 196 M			6				1.	-0.7	24	1.	EMC110	1 .			30
251				1.								6			7				1.			1.		1 . 3			37
1				1						1	Ī		1			1			1			1		1		1	
301		14	•	1.	1	5		1	6	١.	1	8	1.	. 2	0	1	.:	22	1.	2	6	1.3	31	1		1	
351				1.	1	5	١.	1	8	1.	2	0	1.	. 2	3	1	. :	26	1.	3	2	1		1		1	
401		1	•	1.	1	8		2	0	١.	2	3	1.	. 2	7	1	. 3	32	1			1		1		1	
- 1				1						1			1			1			1			1		1		1	
451				1.		Service Harris							1.	, 3	3	1			!			1				!	
501							•			١.	3	4	!			!			!			!					
551	•	26		! .	S,	,	•	3	5				!			!			!			!					
. !					•								!			1			-			1					
601				1.	2	•						5	-			1			1								
651	•	26		!																		•				100	

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MIL-HDBK-217B DISCRETE SEMICONDUCTORS VARACTOR, STEP RECOVERY, TUNNEL

2.2.8 Diodes, Group VIII

-	-			-
~ ~	ACK B	8 5 70	Ι Δ	CION

DESCRIPTION

MIL-S-19500

Varactor Step Recovery Tunnel

Part failure rate model (λ_p) :

 $\lambda_{\rm P} = \lambda_{\rm b} \times \pi_{\rm E} \times \pi_{\rm Q}$ failures/10⁶ hours where the factors are shown in Tables 2.2.8-1 through 3.

TABLE 2.2.8-1 $^{\rm m}{\rm E}$ FOR GROUP VIII DIODES

	TABLE	2.2	2.8-	2
πα,	QUAL	YT	FAC	TOR

nvironment	πΕ
G _B	1
Sp	1
G _P	5
NS	10
AIT	12
AUT	20
G _M	25
NU	25
Atr	25
AUF	40
ML	40

Quality Level	Q [™]
JANTXV	.5
JANTX	1.0
JAN	5.0
Lower *	25.0

*Hermetic packaged devices. *

Supersedes page 2.2.8-1, 20 Sep 74

TABLE 2.2.8-3
MIL-S-19500 DIODES, GROUP VIII VARACTORS, STEP RECOVERY, & TUNNEL BASE FAILURE RATE, \(\lambda_b\), IN FAILURES PER 106 HOURS

oc)			. 1	1		. 2	1	.3	1		4	1		5	1	.6	1		7	da	. 8	1	,9	1 1.
	١-	=		.!•			!	24	-!-	7	-	!-			!		.!-	24	;-		===	-	70	1.09
10		.000	15								8					040	0.0000000000000000000000000000000000000			.0		1.6	170	1.11
20	P 1/2			i	0	33	1 .	37	1.	0	15		04	2	1.6	50		36	ì		77			1.15
25				1.	0	27	1.0		i	.0	37	1 .				053		065		30.	Eliza 790	1.1		1 .18
30	١.	0	24	1.	. 0	28	1.0	34	1.	04	0	1 .	04	7	1.0	56	1	57	9		93	1.	13	1
40						2002 437		137	1	04		1 .				065		, 38		.1		1.	18	1
50		0	31	!	.0	35	1.0	142	! .	0	0	1.	06	1	1.0	77	1	10		.1	5	!		
55	1	1	3,	1		37	1.0	144	1.	0!	53		06		1.0	384	1.	11		.1	A	1		
60	0.7		Marine St. Co.	1000	-			47		0						93		13				i		1
65	10.15	25.7						50	1.			1.	2017		1.1		1	15				1		1323
	1			1			! .		1			1			! .		1					!		!
70								53	-	0		1.			1.1		1.	18				!		
75		3	53	1	3	50	1.8	56	1:	8	,9	1.	Ŷa	3	1:1		1					i		85
				i			1		1			1			1		i					i		i
a5		0	44			**************************************		55		0		1.			1.1	.8	1					1		1
90			MICHAEL TO I			0.720		70		1	3		23.50		1		1					1		1
95		0	57	!	0	51	1.0	77	1.	10	,	1.	15		!		!					1		!
20	١.	2	53	i.	. 0	55	1.0	64	i.	11	0	i .	18		i		1					i		17.50
25				1.				73		1		i			1		1					1		1
101	١.	0	51	1.	0	77.	1.1	0	1.	1:	•	1			1		1			1		1		1
				1			١.		1			1			1		1					1		
15			25	1:	0				1.	11		!			1		1					1		1
201	00/200			41/1	1		1.1	7	i			:			;		i					i		
				1					i			i			i		i					i		i .
30		21	84	1.	1	1	1.1	9	1			1			1		1		201			1		1
35	2190				1		1		1			1			1		1					1		
40		11	,	!	. 1	,	!		!			!			!		!					!		!
45		,	1		. 1	8			-			1					1					1		
50	3947		B. 15. 4	1					1						1		1					i		i
55			200	i			i		i			i			i		i					i		i
	1	5		1			!		!			!			1		1					1		!
60		1		!			!		!			!			!		!					!		
				1			1		1			1			1		1					-		1
							1		1			i			1		1					1		1

2.2.9 Microwave Transistors, Group IX

SPECIFICATION

DESCRIPTION

MIL-S-19500

Bipolar microwave power transistor for frequencies above 200 MHz and average power \geq 300 milliwatts

The part failure rate, λ_p , is:

$$\lambda_{P} = \lambda_{B} \pi_{Q} \pi_{A} \pi_{F} \pi_{T} \pi_{M} \pi_{E}$$

where:

 $\lambda_{\rm B}$ = 0.10 failures/10⁶ hours

"0 = quality factor, Table 2.2.9-1

 π_{A} = application factor, Table 2.2.9-2

TF = factor for frequency and peak operating power, Table 2.2.9-3

TT = temperature factor, Table 2.2.9-4

"M = matching network factor, Table 2.2.9-5

TE = environmental factor, Table 2.2.9-6

See bibliography items 42-46 for the model background.

TABLE 2.2.9-1
TO, QUALITY FACTOR

QUALITY LEVEL*	πο*
JANTXV with IR scan for die attach and screen for barrier layer pinholes on gold metallized devices	1
JANTX or Equivalent	2
JAN or Equivalent	4
LOWER QUALITY	10

^{*-} These quality values apply to hermetically sealed devices only, and do not apply to devices sealed or encapsulated with organic materials.

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2.2.9-1

TABLE 2.2.9-2
TA, APPLICATION FACTOR

APPLICATION	π _A
Pulse Amplifier, Duty Factor < 5%	.aram lasisa, rea
Pulse Amplifier, Duty Factor ≥ 5%, ≤ 30%	2
Pulse Amplifier, Duty Factor > 30%	4
Continuous Wave	4
Oscillator Section Sec	roady 4 Lange

TABLE 2.2.9-3

TF, FACTOR FOR OPERATING POWER AND FREQUENCY

Freq. (GHz.)	PEAK OPERATING POWER (WATTS)										
	.03 to 5	10	20	30	50	100	200	300			
0.2 to 0.4	1	. Note to the same	1	1	1	1	3	10			
1.0	1.5	1.5	1.5	1.5	2	5	10				
1.5	1.5	1.5	1.5	1.5	3	10					
2.0	2.0	2.0	6.0	10	20						
3.0	4.0	8.0	20					VIII.			
4.0	10.0	30									

Supersedes page 2.2.9-2, 20 Sep 74

TABLE 2.2.9-4. π_T , TEMPERATURE FACTOR (See Note Below)

T (°C)	V _C /BV	CES for	Alumin	um .	V _C /BV _{CES} for Refractory Metal-Gold					
	0.40	0.45	0.50	0.55	0.40	0.45	0.50	0.55		
100	0.38	0.76	1.1	1.5	0.1	0.2	0.3	0.4		
110	0.57	1.1	1.7	2.3	0.1	0.2	0.3	0.4		
120	0.83	1.7	2.5	3.3	0.1	0.2	0.3	0.4		
125	1.0	2.0	3.0	4.0	0.25	0.5	0.75	1.0		
130	1.2	2.4	3.6	4.8	0.25	0.5	0.75	1.0		
140	1.7	3.4	5.1	6.8	0.25	0.5	0.75	1.0		
150	2.4	4.7	7.1	9.4	0.25	0.5	0.75	1.0		
160	3.2	6.5	9.7	13.	0.5	1.0	1.5	2.0		
170	4.4	8.7	13.	17.	0.5	1.0	1.5	2.0		
180	5.8	12.	17.	23.	0.5	1.0	1.5	2.0		
190	7.7	15.	23.	31.	0.5	1.0	1.5	2.0		
200	10.	20.	30.	40.	0.5	1.0	1.5	2.0		

NOTES:

Tabulated values of π_{T} are derived from the following equations:

for Aluminum,
$$\pi_{\rm T} = 3.96(10)^7 \left(\frac{\rm V_C}{\rm BV_{CES}} - .35\right) e^{-\left(\frac{5770}{\rm T+273}\right)}$$
 for $100 \le \rm T \le 200$

$$\pi_{\rm T} = 7.58 \left(\frac{\rm V_C}{\rm BV_{CES}} - .35\right) \text{ for } \rm T \le 100$$
For Refractory Metal-Gold, $\pi_{\rm T} = 2 \left(\frac{\rm V_C}{\rm BV_{CES}} - .35\right)$ for $\rm T \le 125$

$$\pi_{\rm T} = 5 \left(\frac{\rm V_C}{\rm BV_{CES}} - .35\right) \text{ for } 125 \le \rm T \le 160$$

$$\pi_{\rm T} = 10 \left(\frac{\rm V_C}{\rm BV_{CES}} - .35\right) \text{ for } 160 \le \rm T \le 200$$

where:

T is peak junction temperature (°C),

V_C is operating voltage (volts), and BV_{CES} is collector-emitter breakdown with base shorted to emitter (volts).

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2.2.9-3

TABLE 2.2.9-5 TM, MATCHING NETWORK FACTOR

INTERNAL MATCHING	π _M
Input & Output	Switche 1 set ga
Input Only	2
No Matching	4

TABLE 2.2.9-6 TE, ENVIRONMENTAL FACTOR

Envir.	G _B	s _F	G _F	N _S	A _{IT}	AUT	G _M	Nu	A _{IF}	AUF	_ሺ
π _E	1	1	2	2	3	4	4	6	6	8	8

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MIL-HDBK-217B

DISCRETE SEMICONDUCTORS

2.2.10 INSTRUCTIONS FOR USE OF SEMICONDUCTOR MODELS

2.2.10.1 Device Ratings

Transistors are normally rated at maximum power dissipation and diodes at maximum current permissible. Usually each device is given two temperature rating points:

- 1 TMAX Maximum permissible junction temperature,
- T_S Maximum ambient or case temperature at which 100 percent of the rated load can be dissipated without causing the specified maximum junction temperature to be exceeded. (Case temperatures are given primarily for power devices used on heat sinks.)

As the ambient or case temperature rises above the T_S value, the internal temperature rise (i.e., the power load) must be decreased so that T_{MAX} is not exceeded. This is illustrated in Figure 2.2.10-1.

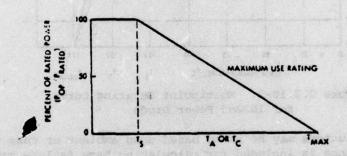


Figure 2.2.10-1. Conventional Derating Curve

Note:

T_c = temperature at which derating begins

T_{MAX} = maximum rated junction temperature

T_A = ambient temperature

T_C = case temperature

POP = actual power dissipated

 P_{MAX} = maximum rated power at T_{S}

Maximum junction temperature (T_{MAX}) is normally 175 or 200°C for silicon and 100°C for germanium devices. Although T_S is usually 25°C, it is different for same devices (such as power devices).

DISCRETE SEMICONDUCTORS

Some devices have a multipoint derating curve as shown by the solid line in the example of Figure 2.2.10-2. The failure rate of a device with multipoint derating can be estimated with the present models by assuming the device to be linearly derated from T_S to T_{MAX} as shown by the dashed line. The use of this assumption will result in a predicted failure rate higher than that the device might actually experience, with the amount of error dependent upon the difference between the two rating values where T_S intersects the assumed and actual rating plots.

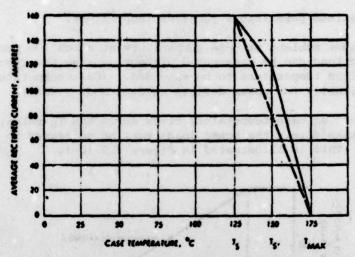


Figure 2.2.10-2. Multipoint Derating Curve for 1N3263 Power Diode

Since semiconductors may be rated based upon ambient or case temperatures, the following guidance is included for calculating base failure rates:

- Mo Heat Sink Used and Ambient Rating Known Calculate stress and temperature (if necessary) per paragraph 2.2.10.2 and use base failure rate table.
- No Heat Sink Used and Only Case Rating Known If device rating based upon ambient temperature cannot be determined, calculate the base failure rate as in 1 above and multiply by 10.
- 3 Heat Sink Used and Case Rating Known Calculate base failure rate as in 1 above.
- 4 Heat Sink Used and Only Ambient Rating Known If device rating based upon case temperature cannot be determined, calculate base failure rate as in 1 above.

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2.2.10.2 Determining Appropriate Stress Ratio & Temperature.

The base failure rate tables are based upon ambient or case temperature (T degrees C) and electrical stress ratio (S). The following instructions show the methods for calculating S. In some cases, the operating ambient or case T must be corrected before entering the failure rate tables. These corrections, where needed, are indicated in (7) below. Operating junction temperatures do not have to be calculated to use the models.

- (1) Groups I, II & III Transistors.
 - a. Single device in case.

For Silicon,
$$S = \frac{P_{OP}}{P_{MAX}}$$
 (C.F.) For Germanium, $S = \frac{P_{OP}}{P_{MAX}}$

where:

Pop = actual power dissipated

PMAX = maximum rated power at TS

C.F. = stress correction factor per (7) below

b. Dual device in single case (equally rated).

$$S = \begin{bmatrix} P_1 \\ P_S \end{bmatrix} + P_2 \begin{bmatrix} 2P_3 - P_T \\ P_T \times P_S \end{bmatrix}$$
 (c.f.)

where:

S = stress ratio of side being evaluated

P1 = power dissipation in side being evaluated

P2 = power dissipation in other side of device

Ps = maximum power rating at Ts of one side of the dual device with the other side not operating (one side rating)

PT = maximum rating at T_S with both sides operating (both side rating)

NOTE: Specifications for dual devices in one case usually give a maximum rating for each device and a total power rating which is significantly less than the sum of individual ratings.

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C.F. = stress correction factor per (7) below for silicon
C.F. = 1.0 for germanium

(2) Groups IV & VI General Purpose Diodes & Thyristors.

For Silicon,
$$S = \frac{I_{OP}}{I_{MAX}}$$
 (C.F.) For Germanium, $S = \frac{I_{OP}}{I_{MAX}}$

where:

IOP = operating average forward current

I_{MAX} = maximum rated average forward current at T_S

C.F. = stress correction factor per (7) below

(3) Group V Zener Diodes

Zener diodes are rated for maximum current or power or both. Either rating may be used as follows:

$$S = \frac{P_{OP}}{P_{MAX}} (C.F.) \quad \text{or } S = \frac{I_{Z(OP)}}{I_{Z(MAX)}} (C.F.)$$

where:

Pop = actual power dissipated

 P_{MAX} = maximum rated power at T_{S}

IZ(OP) = actual operating zener current

IZ(MAX) = maximum rated zener current at TS

C.F. = stress correction factor per (7) below

- (4) Group VII Microwave Mixer Diodes
 - S = Operating Spike Leakage (ergs)
 Rated Burnout Energy at 25 degrees C
- (5) Group VII Microwave Detector Diodes
 - S = POP (Operating Power Dissipation)
 PMAX (Rated Power at 25 degrees C)

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2.2.10-5

(6) Group VIII Varactor, Step Recovery, and Tunnel Diodes $S = \frac{P_{OP}}{P_{MAX}} (C.F.)$

where:

Pop = operating power dissipated

PMAX = maximum rated power at TS

C.F. = stress correction factor per (7) below

- (7) Stress Correction Factor (C.F.)
 - a. Devices with T_S = 25 degrees C & T_{MAX} = 175 degrees C to 200 degrees C

C.F. = 1

b. Devices with Ts # 25 degrees C & T_{MAX} = 175 degrees C to 200 degrees C

$$C.F. = \frac{175 - T_{S}}{150}$$

c. Devices with T_S = 25 degrees C & T_{MAX} <175 degrees C

C.F. =
$$\frac{T_{MAX} - 25}{150}$$

and enter Ab table with T = TA + (175 - TMAX)

d. Devices with T_S ≠ 25 degrees C & T_{MAX} €175 degrees C

and enter Ab table with T = TA + (175 - TMAX)

Supersedes page 2.2.10-6, 20 Sep 74

2.2.10-6

2.2.11 Examples of Use of Semiconductor Models.

2.2.11.1 Examples of Stress Ratio Calculations for Dual Transistors.

Example 1.

For a 2N2060

Given operating conditions

For side one

$$S = \frac{P_1}{P_S} + P_2 \left(\frac{2P_S - P_T}{P_T \times P_S} \right)$$

$$S = \frac{0.1}{0.5} + 0.4 \left(\frac{2 \times 0.500 - 0.6}{0.6 \times 0.5} \right)$$

$$S = 0.2 + 0.4 \left(\frac{0.4}{0.3} \right) = 0.2 + 0.4 (1.333)$$

$$= 0.2 + 0.5333$$

$$S = 0.733$$

For side two

$$S = \frac{0.4}{0.5} + 0.1 \left(\frac{2 \times 0.5 - 0.6}{0.6 \times 0.5} \right)$$

$$S = \frac{0.4}{0.5} + 0.1 (1.333) = 0.8 + 0.1333$$

Example 2.

For the same transistor as Example 1

Given operating conditions

Side one P = 0 w

Side two P = 0.5 w

2.2.11-1

Elect (2) Determine the appropriation adjusted circular ratio, operations temporaries of Caeres appropriation at

the device and full outlies environments and

For side one

For side two

$$S = \frac{0.5}{0.5} + 0 (1.333) = 1.0$$

Though there is no dissipation in side one, because of the heating from side two, the stress ratio is still 0.666. If one side of a dual is not connected, treat as single transistor.

Example 3.

For the same transistor as Example 1

Given operating conditions

Side one P = 0.300 w

Side two P = 0.300 w

For either side

$$s = \frac{0.3}{0.5} + 0.3 (1.333)$$

S = 1.0

2.2.11.2 Specific Steps in Computing Failure Rates, Ap

The generalized steps for computing a semiconductor failure rate are summarized as follows:

- Step (1) Collect and summarize the values of parameters basic to prediction for the specific part type.
- Step (2) Determine the appropriate adjusted stress ratio, S, and operating temperature, T. (Refer to Section 2.2.10)
- Step (3) Locate the appropriate λ_b table for the particular group and part type. Derive λ_b for the adjusted stress ratio and reference temperature.
- Step (4) Locate the appropriate table for defining TE and extract the appropriate value for the given environmental service operation.

2.2.11-2

- Step (5) through Step (N-1). Locate the tables appropriate for all the other T adjustment factors and derive the various T constants.
- Step (N) Perform the computation indicated in the mathematical model appropriate for the part type.
- 2.2.11.3 Examples of Failure Rate Calculations

Example 1.

- Step (1) Given: Silicon NPN general purpose JAN grade transistor in linear service at 0.4 of its rated maximum power of 1 watt in fixed * ground installation at 30 degrees C ambient, rated for 500 mw at 25 degrees C with TMAX = 175 degrees C, and operated at 60 percent of maximum voltage.
- Step (2) Stress ratio, $S = \frac{P_{OP}}{P_{MAX}}$ (C.F.) = 0.4 x 1.0 = 0.4

C.F. = 1 for T_S = 25 degrees C and T_{MAX} = 175 degrees C

- Step (3) From Table 2.2.1-7 for T = 30 degrees C and S = 0.4, $\lambda_b^{\rm b}$ = 0.0079 failures/106 hours
- Step (4) From Table 2.2.1-1, Fixed Ground, $\pi_E = 5$
- Step (5) From Table 2.2.1-2, for linear operation, $\pi_A = 1.5$
- Step (6) From Table 2.2.1-3, for JAN quality level, $\pi Q = 1.2$
- Step (7) From Table 2.2.1-4, for 1 watt rating, $\pi_R = 1.0$ Step (8) From Table 2.2.1-5, at 60 percent of rated voltage, $\pi_{S_2} = 1.0$
- Step (9) From Table 2.2.1- 6, for single transistor, $\pi_C = 1.0$
- Step (10) Perform the calculation:

$$\lambda_{p} = \lambda_{b} (\pi_{E} \times \pi_{A} \times \pi_{Q} \times \pi_{R} \times \pi_{S_{2}} \times \pi_{C})$$
 $\lambda_{p} = 0.0079 (5 \times 1.5 \times 1.2 \times 1.0 \times 1.0 \times 1.0)$

 $\lambda p = 0.072 \text{ failures/}10^6 \text{ hours}$

Example 2.

- Step (1) Given: Field effect transistor (FET), JANTX grade, operating at 80 milliwatts at 500 MHz in Fighter Inhabited service at 60 degrees C ambient temperature. (Rated at 200 milliwatts, T_S = 25 degrees C and T_{MAX} = 175 degrees C)
- Step (2) Stress ratio, S = 80/200 = 0.4

2.2.11-3

- Step (3) From Table 2.2.2-5 for T = 60 degrees C and S = 0.4, b = 0.031 failures/106 hours
- Step (4) From Table 2.2.2-1, A_{IF} environment, $\pi_{E} = 25$
- Step (5) From Table 2.2.2-2, freq. >400 MHz, power <300 mw, π_A = 5.0
- Step (6) From Table 2.2.2-4, JANTX grade, TQ = 0.24
- Step (7) From Table 2.2.2-3, single transistor, TC = 1.0
- Step (8) Perform the calculation:

$$\lambda_p = \lambda_b(\pi_E \times \pi_A \times \pi_O \times \pi_C)$$

 $\lambda_{\rm p} = 0.031 \ (25 \times 5.0 \times 0.24 \times 1.0)$

 $\lambda_p = 0.96$ failures/106 hours

Example 3.

- Step (1) Given: Silicon diode, JAN grade, in ground mobile service at 0.4 rated maximum current of 1 amp, operated at 30 degrees C ambient in logic switching with 20 percent of rated voltage.

 Rated 50 ma at 25 degrees C with TMAX = 200 degrees C and naving a metallurgically bonded contact.
- Step (2) Stress ratio, S = 0.4 x 1.0 = 0.4 C.F. = 1.0 for T_S = 25 degrees C and T_{MAX} = 200 degrees C
- Step (3) From Table 2.2.4-7 for S = 0.4 and T = 30 degrees C, b = 0.0025 failures/100 hours
- Step (4) From Table 2.2.4-1, ground mobile service, "g = 25
- Step (5) From Table 2.2.4-2, JAN grade, πQ = 1.5
- Step (6) From Table 2.2.4-3, for 1 amp, $\pi_R = 1.0$ Step (7) From Table 2.2.4-4, logic switching, $\pi_A = 0.6$
- Step (g) From Table 2.2.4-5, 20 percent rated voltage, $\pi_{S2} = 0.7$
- Step (9) From Table 2.2.4-6, metallurgically bonded contacts, "C = 1.0
- Step (10) Perform the calculation:

Ap = 0.0025 (25 x 1.5 x 1.0 x 0.6 x 0.7 x 1.0)

λp = 0.039 failures/106 hours

2.2.11-4

Example 4.

- Step (1) Given: Silicon dual transistor (complementary), JAN grade, rated for 0.25 W. at 25 degrees C, one side only, and 0.35 W. at 25 degrees C, both sides, with TMAX = 200 degrees C, operating in linear service at 50 degrees C ambient in a sheltered naval environment. Side one, NPN, operating at 0.1 W. and 50 percent of rated voltage and side two, PNP, operating at 0.05 W. and 30 percent of rated voltage.
- Step (2) For side one, stress ratio, $S = \left[\frac{P_1}{P_S} + P_2 \left(\frac{2P_S - P_T}{P_T \times P_S}\right)\right] \quad (C.F.)$

C.F. = 1.0 for TS = 25 degrees C and TMAX = 200 degrees C

$$S = \begin{bmatrix} 0.1 \\ \overline{0.25} + 0.05 \\ \frac{2 \times 0.25 - 0.35}{0.35 \times 0.25} \end{bmatrix}$$
 (1.0)

$$S = 0.48$$

- Step (3) From Table 2.2.1-7, for T = 50 degrees C and S = 0.48, b = 0.012 failures/10⁶ hours
- Step (4) From Table 2.2.1-1, naval sheltered, $\pi_E = 10$
- Step (5) From Table 2.2.1-2, linear, $\pi_A = 1.5$
- Step (6) From Table 2.2.1-3, JAN grade, #q = 1.2
- Step (7) From Table 2.2.1-4, for .25 watt, $\pi_P = 1.0$ Step (8) From Table 2.2.1-5, at 50 percent of rated voltage, $\pi_{S_2} = 0.75$
- Step (9) From Table 2.2.1-6, for complementary pair, $\pi_C = 0.7$
- Step (10) Perform the calculation for side one:

$$\lambda_{p} = \lambda_{b} (\pi_{E} \times \pi_{A} \times \pi_{Q} \times \pi_{R} \times \pi_{S_{2}} \times \pi_{C})$$

 $\lambda_p = 0.012 (25 \times 1.5 \times 1.2 \times 1.0 \times 0.75 \times 0.7)$

λp = 0.1134 failures/10⁶ hours for side one

Step (11) For side two, stress ratio,

$$S = \frac{0.05}{0.25} + 0.1 \left(\frac{2 \times 0.25 - 0.35}{0.35 \times 0.25} \right)$$

S = 0.37

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- Step (12) From Table 2.2.1-7, for T = 50 degrees C and S = 0.37, λ_b = 0.014 failures/10⁶ hours
- Step (13) π_E , π_A , π_Q , π_R and π_C same as for side one
- Step (14) From Table 2.2.1-4, at 30 percent of rated voltage, ${}^{\pi}S_2 = 0.36$
- Step (15) Perform the calculation for side two: $\lambda_{p} = \lambda_{b} (\pi_{E} \times \pi_{A} \times \pi_{Q} \times \pi_{R} \times \pi_{S_{2}} \times \pi_{C})$ $\lambda_{p} = 0.014 (10 \times 1.5 \times 1.2 \times 1.0 \times 0.36 \times 0.7)$ $\lambda_{p} = 0.06 \text{ failures/} 10^{6} \text{ hours for side two}$

Example 5.

- Step (1) Given: Silicon diode, JANTX grade, in fixed ground service at 0.6 rated maximum current and 40 percent rated voltage in power rectifier operation at 60 degrees C case temperature. Device rated at T_S = 100 degrees C case temperature and T_{MAX} = 150 degrees C and has a metallurgically bonded contact.
- Step (2) Stress ratio, S = 0.6 (C.F.) $\frac{T_{MAX} T_{S}}{150} = \frac{150 100}{150} = 0.333$ S = 0.6 x 0.333 = 0.2 Temperature for λ_{D} computation, T = T_{C} + (175 - T_{MAX}) T = 60 + (175 - 150)
- Step (3) From Table 2.2.4-6, for T = 85 degrees C and S = 0.2, λ_b = 0.0039 failures/106 hours
- Step (4) From Table 2.2.4-1, fixed ground, TE = 5
- Step (5) From Table 2.2.4-2, JANTX grade, To = 0.3
- Step (6) From Table 2.2.4-3, power rectifier, $\pi_A = 1.5$
- Step (7) From Table 2.2.4-4, at 40 percent of rated voltage, TS2 = 0.7
- Step (8) From Table 2.2.4-5, for metallurgically bonded contacts, $\pi_C = 1.0$
- Step (9) Perform the calculation: $\lambda_p = \lambda_b (\pi_E \times \pi_Q \times \pi_A \times \pi_{S_2} \times \pi_C)$ $\lambda_p = 0.0039 (5 \times 0.3 \times 1.5 \times 0.7 \times 1.0)$ $\lambda_p = 0.006 \text{ failures/} 106 \text{ hours}$

Example 6.

- Step (1) Given: Microwave transistor, JANTX Equivalent quality, in mobile ground environment as a pulse amplifier at 20% duty factor with a power output of 30 watts at 1.5 GHz. The device package has input and output matching networks and uses refractory metal-gold metallization. VC = 28 volts and BVCES = 56 volts. The peak junction temperature is 140°C.
- Step (2) From Table 2.2.9-1, JANTX Equivalent, $\pi_Q = 2$.
- Step (3) From Table 2.2.9-2, pulse amplifier with 20% duty factor, $\pi_A = 2$.
- Step (4) From Table 2.2.9-3, 1.5 GHz. & 30 watts, $\pi_F = 1.5$.
- Step (5) $V_C/BV_{CES} = 28/56 = 0.5$. From Table 2.2.9-4, $V_C/BV_{CES} = 0.5$, $T = 140^{\circ}C$, and with refractory metal-gold metallization, $\pi_T = 0.75$.
- Step (6) From Table 2.2.9-5, input and output matching networks, $\pi_{M} = 1$.
- Step (7) From Table 2.2.9-6, mobile ground (G_M) , $\pi_E = 4$.
- Step (8) Perform the calculation:
 - $\lambda_{P} = \lambda_{R} \pi_{O} \pi_{A} \pi_{F} \pi_{T} \pi_{M} \pi_{E}$
 - = 0.1 (2) 2 (1.5) 0.75 (1) 4
 - = 1.8 failures/10⁶ hr.